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Spreckels SUGAR BEET Bulletin

VOLUME XIII 1949

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SPRECKELS SUGAR BEET BULLETIN

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. XIII JANUARY-FEBRUARY 1949 No. 1



1

DO SOMETHING ABOUT THE WEATHER

Weather at planting time can make the difference between a perfect stand or none at all.

FROST DAMAGE
SOIL CRUSTING
SOIL DRYING

are some of the planting hazards that can be lessened by close attention to weather conditions.

HONEY-DEW

WEATHER BUREAU RECORDS CAN HELP THE BEET GROWER

By A. V. PIERSON
U. S. Weather Bureau, Sacramento, California

EDITOR'S NOTE — It has been said that farming is the profession of gambling with the weather. Betting against the weather can never be a sure thing, but a knowledge of weather probabilities can greatly increase the odds in favor of winning.

Mr. Pierson has painstakingly analyzed the Weather Bureau records and calculated some probability charts covering two subjects of great importance at planting time—Killing Frosts and Extreme Crusting Conditions. While these charts apply only to the vicinity of Sacramento, they pave the way for a new phase of weather study which may eventually be invaluable to farmers everywhere.

CONDITIONS FAVORABLE TO CRUST FORMATION

When a hard crust forms on a recently planted seed bed, germination may be inhibited severely by the inability of sprouts to penetrate upward through the crust.

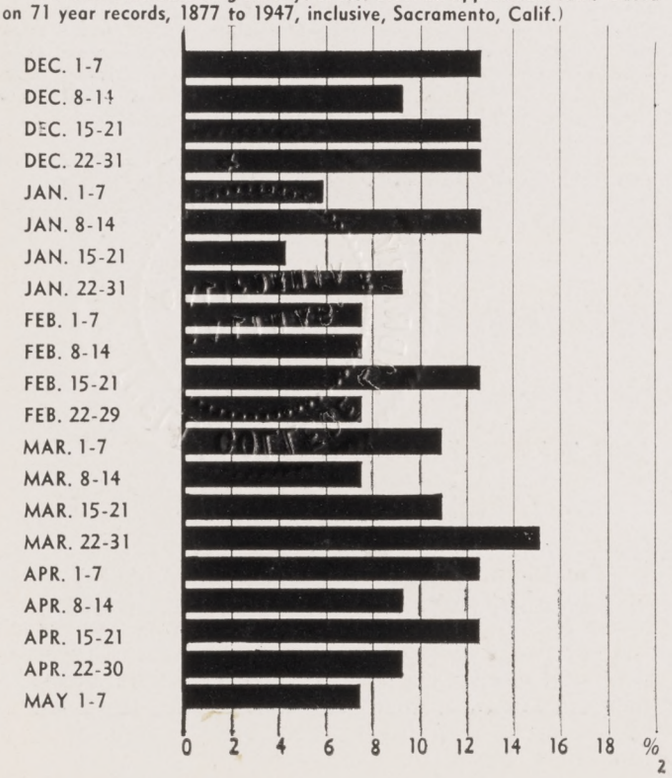
Weather conditions are the basic causes of crusting, although the seriousness of the effects depends on the soil texture. Highly organic (peat) soils are immune to crusting, while soils containing more or less clay are most susceptible.

The combination of weather events most certain to create serious crusting is a beating rain followed by one of the dry north winds typical of the Sacramento Valley. While any weather condition other than continued rain or fog may permit crust formation, this rain-and-North-wind combination is a never-failing cause of severe crusting.

Referring to the Percentage Probability Chart, (Fig. 1), which shows the frequency of north winds following rain at Sacramento, one finds the week of January 15-21st with the minimum probability of 4.4%, and the period March 22-31st with the maximum probability of 14.5%. Other weeks fall in between, usually near the 10% value. In plotting this data, a north wind was considered to follow a rain of .01 inch or more, if it came within one week after the ending of the precipitation period. Traces of rain were not considered, and wind eight days or longer after a rain were omitted. One would be inclined to ask the question, "What about the average rainfall during months of maximum or prevailing north winds?" For the months found to fall on the Percentage Frequency Chart, December and February were found to average over one inch below respective normals for those windy months, January over one and one-half inches below, and March and April about one-half inch below. However, the averages cover up a few outstanding exceptions. For example December of 1894 and 1940, were north-wind months with over 8 inches of rain, February 1937 over 6 inches, and March 1888 over 3 inches. From December through mid-April the seasonal chance of a north wind following a rain, was very near 10%, although on a weekly basis, the percentages varied from 4.4% to 14.5% as outlined on the Chart.

FIG. 1 — PERCENTAGE PROBABILITY OF EXTREME CRUSTING CONDITIONS

A North wind occurring six days or less after an appreciable rain. Based on 71 year records, 1877 to 1947, inclusive, Sacramento, Calif.)

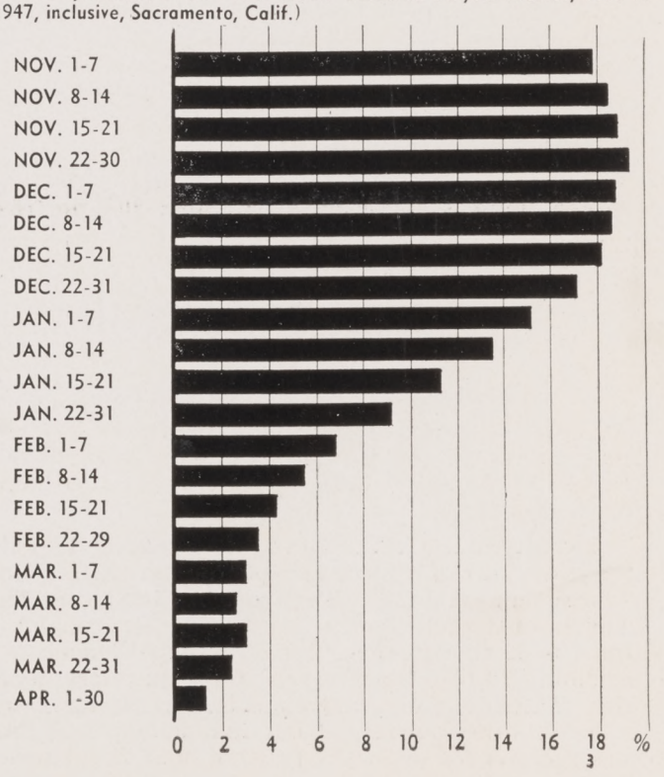


KILLING FROSTS AND, OR MINIMUM TEMPERATURES

Four out of every five frosts, and, or temperatures 32° below in Sacramento City, occur between December 1st and February 15th, with the greatest number during the Dec. 22-31st period. In calculating the frequency of these periods two, three, and

FIG. 2 — PERCENTAGE PROBABILITY OF A KILLING FROST

(Temperatures of 32° F. or lower. Based on 71 year records, 1877 to 1947, inclusive, Sacramento, Calif.)



up to nine day periods were counted as one case on the frequency chart, since a frost the first morning does most of the damage, and the second and third mornings were, in truth, only a continuation of that specific cold spell. The longest period with a temperature of 32° or below occurred December 21-30th, in 1940, with ten cold nights in a row, the lowest of which was 26°. However, the coldest temperature recorded in Sacramento City since 1877, was 17° which came in a seven day cold period, December 9-15th, 1932.

Referring to the Killing Frost Probability Chart, (Fig. 2), on February 1st, for example we see the figure 6.7%, which represents the percentage probability of a frost or a minimum temperature of 32° or less, occurring between that date and the termination of the frost season. During the week of February 1-7th, the odds are 13½ to 1 against frost, which **odds against frost** increases rapidly to 32½ to 1 against frost on March 1st, and 70 to 1 against frost by April 1st.

All these temperatures were measured within the city of Sacramento, several floors above the street-level, so that they are not representative of ground temperatures in the outlying districts. On a cold morning, temperatures in the vicinity of Sacramento vary ten or more degrees; with temperatures in the outlying ground-level districts much lower as a rule.

Very cold temperatures occur chiefly because of two reasons, either perfectly clear radiation nights, or the advance of cold polar air into our districts. A combination of both these influences is responsible for the extremely low temperatures of longer duration. The amount of moisture in the air has some effect, temperature drops are slower and steadier on damp nights, with the sudden, rapid drops on dry nights. For equally low temperatures the damage to fruit or plants will be greater on nights with the dampest air. Also fruits or plants will freeze more quickly in moving cold air than they will if it is very still.

When the early morning temperature is 32°, and the dew point is much lower, say near 20°, no frost will be visible on trees or bushes. However, green growth will be killed by the low temperature, sometimes called a black frost because it is invisible. In order to have a white frost, or hoar frost, the temperature and dew point must coincide near 32° or below.

Frost and freezing temperatures are always a particular threat to sugar beets when they are just sprouting from the ground. A killing frost at this stage may necessitate replanting, and a late start for the replanted crop.

Exceptionally warm and moist weather in February and March will cause rapid beet growth, which is most vulnerable to a late frost in the spring. The odds against such occurance on the frost probability Chart is 32 to 1 against, during week of March 1-7, becoming 70 to 1 against April 1-7th, in Sacramento City. The odds may vary considerably if calculated in neighboring localities, but insufficient temperature records for outlying districts limit our figures.

. . . . . BULLETIN . . . . . .

HIGHER SUGAR PRICES INDICATED

Under the Sugar Act of 1948 the Secretary of Agriculture is required to establish the total amount of sugar that may be marketed in the United States from all supplying areas each year. This direct control of supply is, of course, the dominating factor in determining the level of sugar prices.

On December 23, 1948, Secretary of Agriculture Brannan set this total for the year at 7,250,000 short tons, raw value, or 50,000 tons greater than the final 1948 quota. However, it is important to consider the fact that actual deliveries of sugar to the trade in 1948 will in all probability exceed 7,300,000 tons. The delivery of 100,000 tons of sugar in excess of the final quota is made possible by a reduction in refiners' inventories.

The apparent reason for the Secretary establishing the initial 1949 quota below the level of 1948 deliveries is to make certain that a price for sugar more in line with the mandate of the Sugar Act will result. An indication that the Secretary believes the present price of $7.75 per 100 lbs., cane basis, is too low to accomplish this purpose is contained in the following paragraph extracted from the press statement released by the Department of Agriculture at the time the 1949 quota was announced.

"Sugar prices declined during 1948 while costs of production, processing and transportation generally increased. Current prices are somewhat below the relative levels indicated in the Sugar Act as a consideration in determining sugar requirements. In fact, they are below $8.40 per hundred pounds, which was the price prevailing when price control was discontinued. In view of the reduction in stocks, however, it is expected that the demand for quota sugar will improve substantially and that the announced determination will achieve the objectives set forth in the Sugar Act of providing a supply of sugar for the year at prices which will 'not be excessive to consumers and which will fairly and equitably maintain and protect the welfare of the domestic sugar industry'."

Many in the sugar trade are interpreting the above to mean that the Department would not look with disfavor on an $8.40 cane refined price.
Dated: December 27, 1948

SPRECKELS SUGAR COMPANY UNAFFECTED BY LIQUIDATION

The operation of Spreckels Sugar Company is in no way affected by the liquidation of J. D. and A. B. Spreckels Company. The one-half interest which that company owned in Spreckels Sugar Company was sold some time ago to Spreckels Companies, a new corporation, formed by a group for the purpose of acquiring this interest and other assets of J. D. and A. B. Spreckels Company.

SOME FACTORS IN INFLUENCING A FERTILIZER PROGRAM

By F. JACK HILLS, *In Charge*
Agricultural Experiments, Spreckels Sugar Company

In deciding whether or not to fertilize his sugar beets the grower is governed primarily by the consideration of the probable effect on his net returns. If he thinks that his net returns can be increased by a fertilizer program, he must then consider what kind of fertilizer to use, how much to apply, and when to apply it.

There is ample evidence that there are no simple soil tests which provide adequate information for the majority of California soils. The technique of plant tissue analysis gives promise of providing a means for evaluating the adequacy of the major plant nutrients and when applied to a given farm over a period of years could take a good deal of the guess work out of fertilization. At the present time, however, this technique is not available on an extensive scale and the grower must rely on his own judgment and experience.

The main purpose of this discussion is to present some fundamental factors for consideration which may aid the sugar beet grower in deciding on the best practical answer to his fertilization problems.

EVERY FIELD IS AN INDIVIDUAL

First of all, it must be remembered that each field, or a series of fields on the same farm having the same soil type and under the same rotation system, is an individual in regard to its fertilizer requirements. The fact that a given field is seriously deficient in nitrogen is not evidence that the 40 acres across the road is likewise deficient. Graphs I, II, and III impressively illustrate this. They show comparative response to nitrogen fertilization on three different fields. These fertilizer trials were conducted in the Woodland area in 1947.

Field "A" was obviously very low in fertility. The growth rate trend is still upward at 240 lbs. of nitrogen per acre. The net gain from an application of 725 pounds of ammonium nitrate (240 lbs. N) was approximately $41.00 per acre. Possibly this gain could have been further increased if more nitrogen had been used.

Field "B" might be considered as of medium fertility. In this case the maximum net return of $80.00 per acre falls at about 140 pounds of nitrogen (425 lbs. of ammonium nitrate).

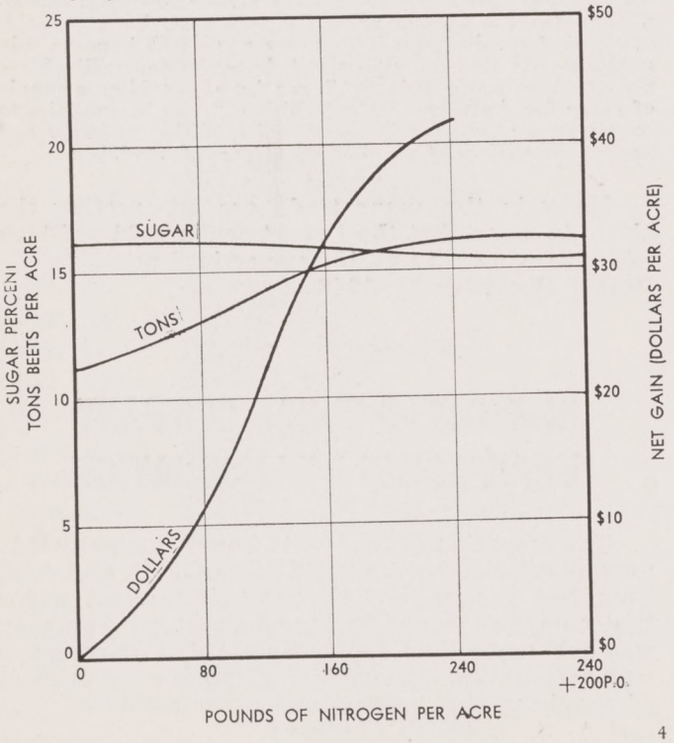
For field "C," one of comparatively high fertility, the point of maximum net return seems to be at about 60 pounds of nitrogen (180 lbs. of ammonium nitrate per acre). The use of additional amounts soon results in a loss, not only of the money spent for fertilizing, but a loss in total beet payments because of a lower sugar content.

The effect of excessive nitrogen on sugar content is well established. A high nitrogen level at or near harvest time results in a decrease in sugar per cent over that which could be obtained had the nitrogen been reduced to a low level sometime prior to harvest.

Note that for all three fields the use of phosphate fertilizer did not increase yields. Its use at any nitrogen level would have decreased the net gain or increased the net loss.

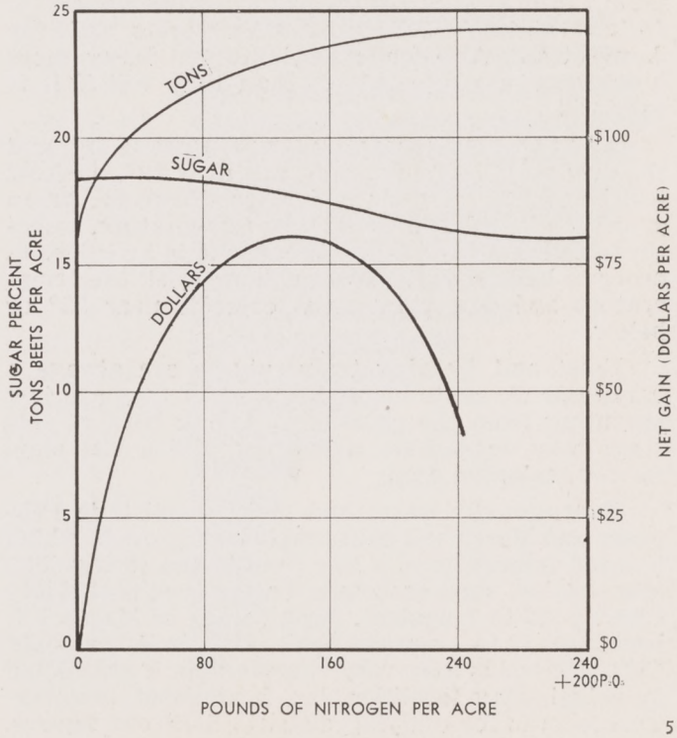
GRAPH I

Field "A" — Low Fertility — Net returns still increasing at 240 pounds of nitrogen per acre.



GRAPH II

Field "B" — Medium Fertility — Marked response to nitrogen.



NITROGEN AND BEET TOPS

In calculating crop values only beet payments have been considered. Beet tops are more sensitive to nitrogen deficiencies and respond more quickly than do the roots to increased nitrogen levels. If our charts had taken the potential value of the tops into consideration, the maximum net gain would be increased and would fall at somewhat higher nitrogen applications.

The mere addition of fertilizer to a field that is severly deficient will not in itself insure a yield increase. For instance, a field which is adequately fertilized but subsequently suffers from a lack of soil moisture may give little or none of the potential response to the fertilizer simply because the plants do not have enough water to meet their growth requirements. The same applies to other factors such as weeds, disease and even abnormally cool weather —all may mask a potential response to fertilization. To obtain the maximum return for the dollar spent on fertilizer, care must be given to all the factors of good farming.

Still to be answered is the question, "How much fertilizer shall I use on my field?" The above discussion has accomplished one of its purposes if the reader now realizes that there is no easy answer.

NITROGEN AND PHOSPHORUS

During the 1947 crop season, the International Minerals and Chemical Corporation, the Spreckels Sugar Company, and the Division of Plant Nutrition of the University of California conducted a series of six fertilizer experiments in the Woodland area. One of the objectives of these trials was to obtain a measure of the response of sugar beets to nitrogen and phosphorus. In other words, to attempt to answer our question of how much fertilizer to use as applied to the Woodland area and to determine whether yields could be increased by using phosphate.

Graphs I, II and III present the harvest results of three of the individual fields included in this series. Graph IV summarizes the average results of all six trials.

Assuming that the six fields selected represent a fair cross section of fertility conditions of the beet fields for the 1947 season, we can arrive at a general conclusion of the area. Graph IV indicates that the maximum net returns of approximately $27.00 per acre was realized for the "average" field by the use of about 130 pounds of nitrogen. This would mean an application of 400 pounds of ammonium nitrate, or 650 pounds of ammonium sulphate per acre.

This hypothetical "average" field gave no response to phosphate. None of the six fields showed an increase in yield from the use of phosphate.

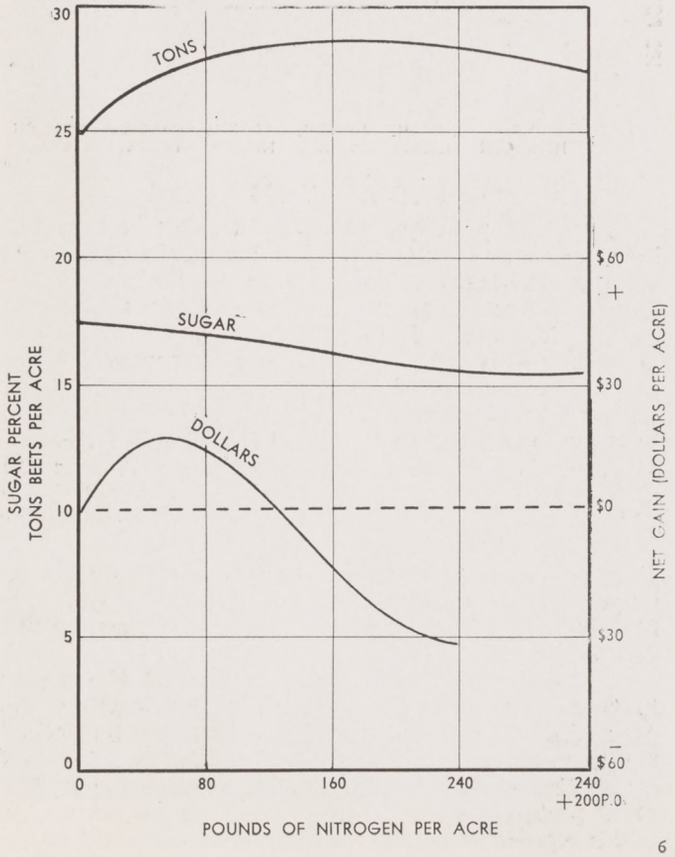
HOW MUCH FERTILIZER?

In deciding on what type of fertilizer to use and how much to apply, it would seem reasonable to rely on the results of a series of experiments, such as these, for a starting point. If the grower considers his field to be somewhat average for the district he would do well to start with from 100 to 150 pounds of nitrogen per acre. If the field to be planted to beets has just come out of alfalfa, or has consistently yielded above average, the farmer will want

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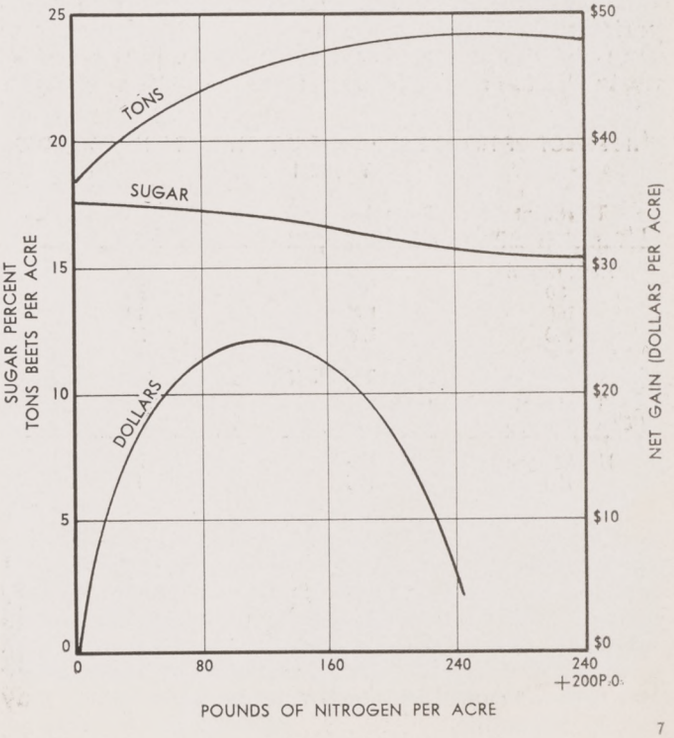
GRAPH III

Field "C" — Comparatively High Fertility — Slight response to nitrogen.



GRAPH IV

Composite results of six fertilizer trials — Woodland area, 1947.



to start with less nitrogen—say from 0 to 80 pounds per acre.

It would seem the better practice to start with somewhat less than the maximum amount one considers the field can use and to add subsequently a little more, say in the form of ammonia gas in the irrigation water, if the plants indicate they can use additional amounts. Care should be used not to apply too much nitrogen late in the season and thereby depress sugar content.

There are some simple "quick tests" to determine whether or not the plants are getting enough nitrogen. The diphenylamine test (See Spreckels Sugar Beet Bulletin, June, 1941) is one of these and can be very helpful in deciding if more nitrogen is needed.

Simple farm experiments can be a great help in improving fertilizer practices. The farmer can better evaluate his particular fertilizer needs by trying varying rates of nitrogen application on his own fields. In this way he may also check whether phosphate or other materials will increase his net returns. The Spreckels' fieldmen are always willing to assist in laying out such experiments and to help in any way possible.

Various root-rot diseases can seriously reduce any given potential yield. Keeping plants adequately supplied with nitrogen seems to have a very favorable effect in reducing the damage that is caused by infestations of certain root rots.

The effect of nitrogen fertilization on the incidence of root-rot disease can be seen in the tables below. The data in Table 1 were obtained from one of the six 1947 experiments referred to above. Note the reduction in harvestable stand in the nitrogen deficient beets. The principal diseases that caused the damage were: southern sclerotium root rot, dry rot canker and wet root rot.

The same effect was observed in a fertilizer experiment in Kern County in 1948. Table 2 indicates the reduction in stand and the increase in amount of rot in the harvested beets associated with a nitrogen deficiency. In this case, the principal disease involved was dry rot canker. The question of what kind of nitrogen fertilizer to use is one frequently asked. This consideration becomes important in selecting the cheapest source of nitrogen and even more so in these times of fertilizer shortages when the type of material a grower has been using may not be available.

THE EFFECT OF NITROGEN DEFICIENCY ON CERTAIN ROOT ROTS

TABLE I

Treatment (lbs. of N. per acre)	Beets Harvested per 100 ft. of Row	Rotted Beets, % of POTENTIAL Harvestable Stand
No Nitrogen	58	58
80	86	36
160	105	18
240	100	22

TABLE II

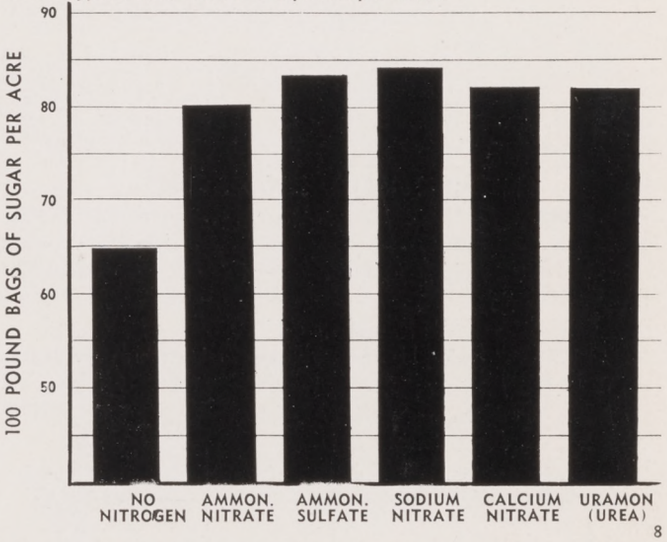
Treatment (lbs. of N. per acre)	Beets Harvested per 100 ft. of Row	Rotted Beets, % of TOTAL Beets Harvested
No Nitrogen	149	23
100	156	12

WHICH SOURCE OF NITROGEN?

Graph V gives the results of one experiment designed to test the effect of various nitrogen sources. This trial was conducted in Kern County in 1948 on a Hesperia loam soil. As the chart indicates, only negligible differences in yield were observed. It is realized that the results cannot be conclusive for all soils of California or even for the same soil if the treatments were repeated for additional years. It is felt, however, that the evidence is strong enough to enable those farming on good agricultural soils to be reasonably assured that no serious loss in yield will occur in using one type of nitrogen fertilizer over another. The important consideration is the use of the proper amounts of nitrogen, regardless of source, so that the plants do not become deficient in this nutrient until late in the season.

GRAPH V

The effect of various nitrogen sources on sugar production. (All materials applied at the rate of 100 pounds per acres.)



8

WHEN TO APPLY FERTILIZER

Here the principle to keep in mind is that the beets should always absorb adequate amounts of nutrients so that their growth is not limited by this factor. Since nitrogen is the most important limiting nutrient factor in most California beet fields, the ideal situation with respect to this nutrient is to have the plants adequately supplied throughout early and mid-season, but to have the nitrogen level in the plants fall to a low level late in the season.

Therefore if a field is of very low fertility, (such as field "A", Graph I) it would probably be beneficial to put on at least some of the fertilizer prior to or at the time of planting. On a more fertile field, a side dressing at thinning time would probably be as satisfactory as any method. For a highly fertile field, it might be well to not use any nitrogen until the plants indicate a need for it.

The above presents only a few of the many factors involved in the problem of fertilization. As complicated as the problem is, much can be gained if some of the basic principles are kept in mind and by realizing that fertility is but one factor of the plant yield equation. Careful farming on all counts will increase returns per dollar spent on fertilizers.

THE 1949 SUGAR BEET SEED PROGRAM

By AUSTIN ARMER
Agricultural Engineer, Spreckels Sugar Co.

Last year's sugar beet seed program initiated a number of important improvements in seed processing. Seed was processed in accordance with the experimental work conducted by the University of California, Divisions of Agricultural Engineering and Plant Pathology, and introduced several major improvements. These were:

1. Controlled partial segmentation to eliminate multiple germ seed balls.
2. Decortication, to remove the outer corky layer from each seed.
3. Screening to produce seed of uniform size.
4. Air classification to remove irregular shapes and light, low germination seeds.
5. Spray treatment with fungicide.

The 1949 product retains all of these features, since each has proved itself beneficial. The new seed differs only in the greater perfection of each of the characteristics.

Segmenting has been replaced by "Burr Reduction." In this step, the seed is passed between a fixed steel burr-plate and a rotating abrasive wheel. Large multiple germ seeds are reduced in size, but the remaining seeds pass through without damage.

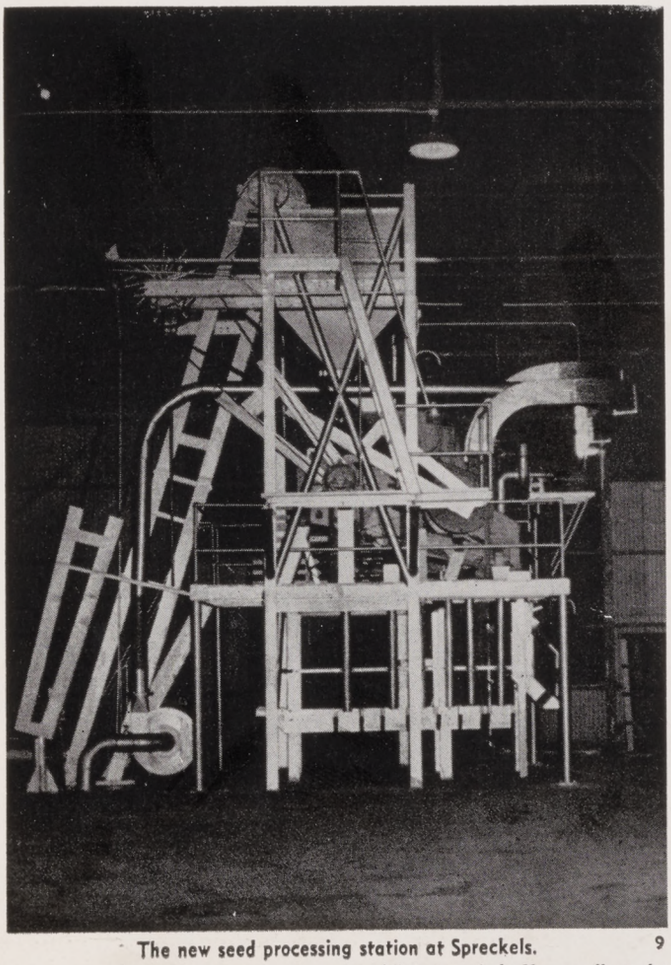
Decortication is accomplished by rolling the seed between opposed rotating disks. The upper disk is rubber covered, while the lower one is a flat abrasive wheel. Not only is the corky seed-coat removed, but each seed is polished to an almost spherical shape.

Screening has been improved, so that the final seed is more uniform in size. This was accomplished by improving the spread of seed over the screens, and by feeding the seed at a uniform rate.

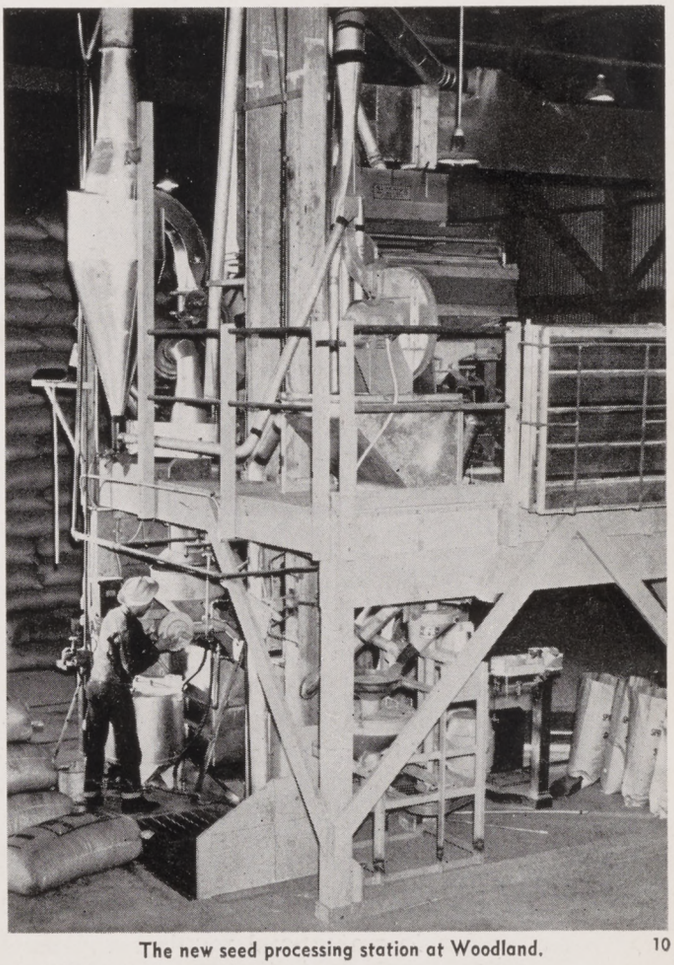
Air classification remains unchanged. This method of increasing germination percentage by retaining only the heaviest, roundest seeds has proved its merit over the past five years.

Spray treatment with fungicide has been improved in several respects, largely through the efforts of the makers of Phygon. This fungicide has proved its effectiveness in preventing damping-off, as well as its complete harmlessness to seed germination. Working on the original suggestion by Spreckels researchers to prepare Phygon in a liquid form, the Naugatuck Chemical Division of U. S. Rubber Company has made important improvements in Phygon Paste. The new material is "Micronized." In this process, the particle size of the active ingredient (Dichloro-napthoquinone) has

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The new seed processing station at Spreckels. 9

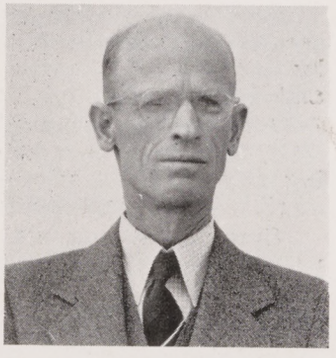


The new seed processing station at Woodland. 10

All dust and chaff are collected outside the buildings in dumping hoppers.

AN AID IN ADJUSTING ROW-CROP IMPLEMENTS

By J. P. FAIRBANK
Division of Agricultural Engineering, University of California



It's something of a chore to set up multiple-row machinery, such as four, six or eight row cultivators, so that all rows are alike. I ran across a good scheme down at the Delta Branch Experiment Station, Stoneville, Miss., the headquarters for the National Cotton Mechanization project. A mechanic was adjusting a four-row tractor-mounted cotton cultivator there in the shop. A number of parallel lines were painted on the shop floor, near the doorway. These lines were spaced to represent the rows and the middles with a distinct center line. The man drove the tractor into the shop with the front wheel exactly on the center line, then proceeded to space the cultivator shanks and set the sweeps just where he wanted them, sidewise and vertically, using the level concrete floor and the lines as guides. It's simple, but it saves lots of fuss and bother out in the field and furthermore the setting is uniform for every row. Wm. E. (Bill) Meek, senior Agricultural Engineer, in charge of the cotton mechanization project for U.S.D.A. told me that many Mississippi farmers had fixed up similar platforms. "Power farming is precision farming" is one of Bill's pet phrases. Some of those Delta cotton planters are cultivating at 6 and 7 miles an hour; rows must be mighty uniform, and the machine must fit them exactly if it is not going to cover or plow out some crop plants.

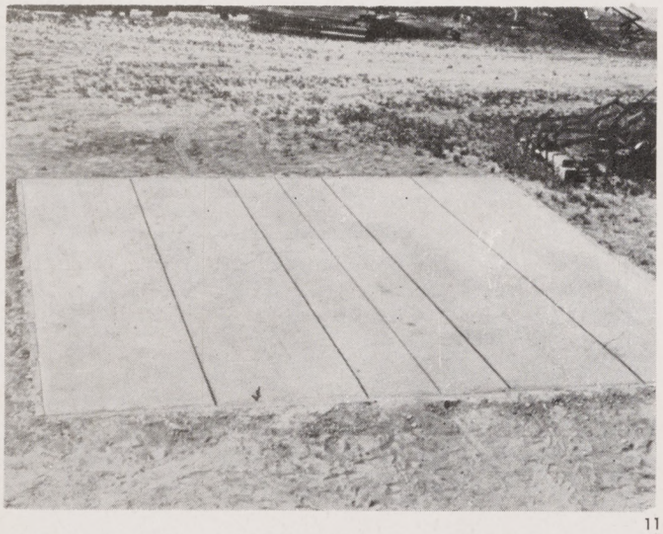
Austin Armer, editor of this Bulletin, doesn't figure many of its readers grow cotton, but he thought sugar beet growers might find these platforms useful for setting beet planters and cultivators, with the lines spaced to represent beet rows.

We built one of these setting-up platforms for our cotton mechanization work in the San Joaquin Valley. Made it 16 feet square, and four inches thick on a gravel fill; took three yards of concrete. We had the parallel row lines finished right in the surface of the concrete, like the lines across a cement sidewalk. (Better have these lines parallel and spaced right the first time—they are hard to change). Then we painted the lines representing the rows green, the main center line red, and left the lines for the middles unpainted, just grooves in the concrete.

The platform should be out in the clear so you have plenty of room to line up the tractor and drive on squarely over the center line.

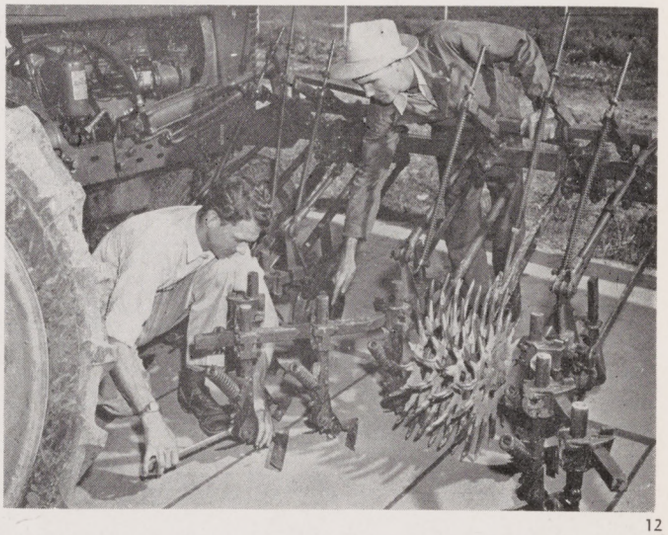
About noon on a hot day you would appreciate a roof over the platform, but maybe that wouldn't be so good. A roof would make a great temptation to use the platform for a storage shed so you couldn't use it when you wanted to adjust implements.

Incidentally, W. E. Meek and B. B. Ewing, Agricultural Engineer for the U.S.D.A. wrote a circular "Line-Diagram Method for the Setting of Farm Implements." It's circular 138, Mississippi State College, Mississippi.



11

The platform has parallel lines painted or trowelled into the cement surface. These lines are spaced in accordance with prevalent row and furrow spacings.



12

After centering the tractor on the marked platform, all tool bar attachments are located by the parallel lines.

(Photo Courtesy Wm. E. Meek)

1949 SUGAR BEET SEED

(Continued from Page 7)

been made so small that covering-power has been markedly increased. The new material forms a more stable suspension in water, and requires no heavy binder to stick the material to the seed.

The "New Look" will be seen on the 1949 seed's outer garment. It is packaged in 50 pound multiwall paper bags. This new package is clean, easy to handle, and moisture-resistant. But it is not waterproof, and seed should be stored under cover where rain or ground moisture can be excluded.

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SPRECKELS SUGAR BEET BULLETIN

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. XIII MARCH-APRIL 1949 No. 2



13

WHERE IS THE MAN WITH THE HOE?

PRE-EMERGENCE SPRAYING
MECHANICAL STAND REDUCTION
IMPROVED CULTIVATION PRACTICES

are the steps that can lead to eventual elimination of hand work in the sugar beet field. Higher yields and lower production costs depend on full use of mechanical aids to Spring Work.

Some of these mechanical aids are illustrated on pages 12 and 13

PLANT SPACING AND WEED CONTROL IN SUGAR BEETS

By AUSTIN ARMER
Agricultural Engineer, Spreckels Sugar Company

Sugar beet field mechanization was first applied to those operations which cost the grower the most money or involved the greatest difficulties in labor procurement. Therefore it is only natural that the harvesting operation was the first to yield to mechanization. The spring operations—thinning, hoeing, and cultivation—are in the aggregate a major part of the total cost of growing a crop of beets. Studies by the Agricultural Extension Service in California over the past three years reveal that the three above operations amount to about $36.00 per acre in the average sugar beet field with occasional fields costing much more.

This $36.00 breaks down into:

Thinning	$12.00
Hoeing	18.00
Cultivation	6.00

Quite obviously anything that can be done to reduce the cost of thinning and hoeing could effect an important saving in the over-all picture.

For cost purposes spring work has broken down into thinning, hoeing, and cultivation. The physical operations, however, resolve themselves into somewhat different classifications, and might well be called plant spacing and weed control.

In a mechanical program, both operations must be anticipated and the whole spring mechanization plan mapped out well before planting time.

A program of mechanized spring work could be outlined as follows:

1. Seed-bed Preparation
2. Pre-emergence Spraying
3. Thinning
4. Cultivating, modified to eliminate some hoeing.

SEED-BED PREPARATION AND PRE-EMERGENCE SPRAYING

Since pre-emergence spraying is one part of spring mechanization, it must be properly anticipated when the seed-bed is prepared. This means that seed-beds, whether flat or on ridges, must be completed well in advance of the date of planting in order to germinate all weed seeds present in the space to be planted. It must be stressed that weather conditions will determine whether or not pre-emergence spraying can be employed.

If weather conditions have been suitable for the germination of weed seeds, the beds or rows should be sprayed with fortified oil emulsions immediately before planting. It is much safer to spray **before** planting. If the field is planted with the idea of spraying immediately thereafter, a shower of rain can upset the whole program.

THINNING

By the time the beet seedlings have emerged and acquired from two to four true leaves, thought must be given to thinning. In the past, mechanical methods of thinning have really been methods of blocking. Blocking operations, whether cross cultivating or traveling down the row with the Dixie chopper or similar devices, have never met with much favor in California. Our seedling stands are almost always very irregular in distribution. Any regular spacing of blocks is therefore inclined to exaggerate the irregularity of the stand with the result that a blocking job usually leaves a series of multiple plants alternating with long blank spaces. Over the past two years our sugar beet friends in the Rocky Mountain states have developed a new philosophy of mechanical thinning based upon the random reduction of stand. Working on the assumption that a satisfactory yield may be had regardless of evenness of spacing, the Rocky Mountain growers have devised a number of machines for removing sugar beet seedling at irregular intervals down the row. An ordinary side delivery rake is an example of this sort of random stand reducer. A wide variety of other random stand reducing machines has been developed.

During the war we fell into some bad habits of spacing or thinning. Labor lapsed into the leaving of larger and larger spaces between plants. This was a very unfortunate situation, and one which may have had a very important bearing on the reduction of yields. Now the grower can go over his field as many times as he wishes with one of these random stand reducing machines and leave a final stand with plenty of plants. A reasonable percentage of doubles will not interfere with the final yield but large clumps are to be avoided. If there are many such clumps a light touch-up with the long handle hoe may prove profitable. *(Continued on Page 15)*



14

The beets on the left were dug from rows which had been blocked 1 inch on 5 inch centers and touched up at hoeing time with a long handled hoe. Compare them with the hand thinned beets (from adjacent rows) pictured on the right and note that the mechanically thinned beets compare well both in size and uniformity.

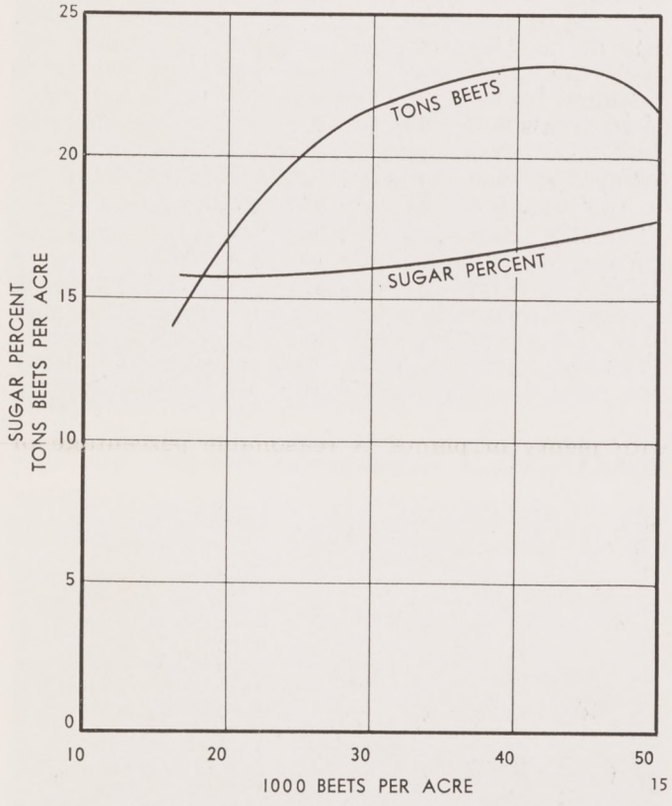
Photos by S. W. McBirney, Senior Agricultural Engineer, U.S.D.A.

MORE BEETS PER ACRE = MORE SUGAR PER ACRE

By GUY D. MANUEL
General Agriculturist, Spreckels Sugar Company

In an effort to grow larger yields of sugar beets, many growers are spending from 20 to 30 extra dollars an acre for fertilizer and water. They find comfort in the belief that everything possible is being done to produce a maximum crop. But after reviewing agricultural records of the Spreckels Sugar Company, we feel that most growers are overlooking a very important factor in arriving at the maximum yield. That factor is keeping a high population of beets per acre.

Tests have been run in most of the beet producing countries of the world to determine the relationship between population and yield. These tests all show that high plant numbers are necessary to secure the maximum crop. The optimum population per acre for a given field or district may vary, but most of the tests show these figures to be well above the average of most commercial fields in California. The chart shown below is based on figures from tests in Holland. They represent a composite of numerous tests compiled over a period of fifteen years.



Growers in the Salinas Valley have done an excellent job of building up their plant populations over the past twenty years. At one time stands averaged about 85 beets per hundred feet of row. Stands now average over 110 beets, and there is still strong evidence that this is not the top figure, especially

(Continued on Page 16)

THE OUTLOOK FOR CROPS COMPETING WITH SUGAR BEETS

By IVAN M. LEE
Assistant Professor of Agricultural Economics, University of California, Berkeley

Editor's Note: This is a summary of a talk presented by Professor Lee at the annual staff meeting of the Agricultural Department of the Spreckels Sugar Company, February 11, 1949. The subject was so timely, and of such interest to sugar beet growers, that we were pleased and honored when Professor Lee agreed to summarize his talk for publication in the Sugar Beet Bulletin.

The main crops competing with sugar beets in production are tomatoes and other truck crops, alfalfa hay, dry edible beans, feed grains (primarily barley), food grains (primarily wheat), Irish potatoes, and cotton.

The outlook for these commodities cannot be considered in complete isolation, since the prospective level of general economic activity is an important determining factor on the side of demand in each case. Furthermore, supply restrictions resulting from the operation of government price-support programs in certain commodities may be felt through increases in production of other commodities.

Some evidence of soft spots in certain consumer goods industries (for example, textiles and automobiles) has appeared in recent months through a greater than normal seasonal decline in employment. However, an expected seasonal rise in employment during the first half of 1949 plus the prospect of larger government expenditures in the fiscal year 1949-50 will probably tip the balance in favor of continued high levels of general economic activity this year. This points towards continued strong domestic demands for farm products this year. As a partial offset, foreign demands, particularly for food and feed grains, might well be down from last year, thus exerting a downward pressure on total demand for these commodities.

Circumstances peculiar to the various products which compete with sugar beets deserve special comment. The outlook for Irish potatoes, cotton, and wheat is tied closely to the government price-support program. The potato program calls for a reduction in acreage of over 40,000 acres in California this year, and prices will be supported at 60 per cent of parity as compared with 90 per cent of parity last year. Cotton and wheat are under no acreage restriction, and prices will be supported at 90 per cent of parity. Production of these crops will probably be up, and prices will probably press against supports.

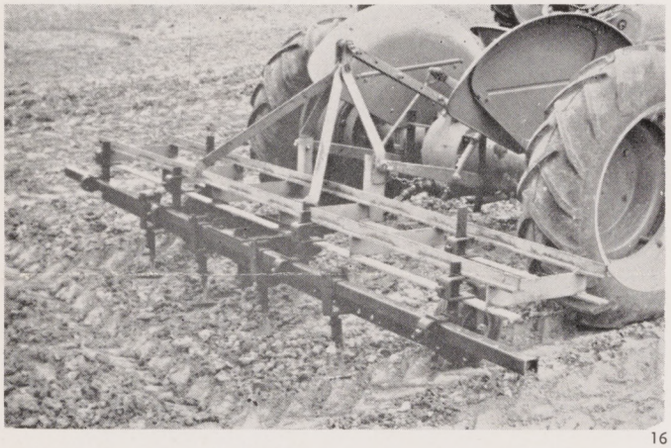
Demands for tomatoes and other truck crops are markedly related to level of consumer incomes. Assuming a continuance of consumer incomes and production of these products near 1948 levels, prices could continue near 1948 levels. Some downward pressure on prices may come through increased production as a result of acreage shifted from potatoes.

The 1948 crop of dry edible beans is being supported at 90 per cent of parity price. Price supports between 60 and 90 per cent of parity are mandatory in 1949. Since California is an important contributor to total United States production, production in

(Continued on Page 16)

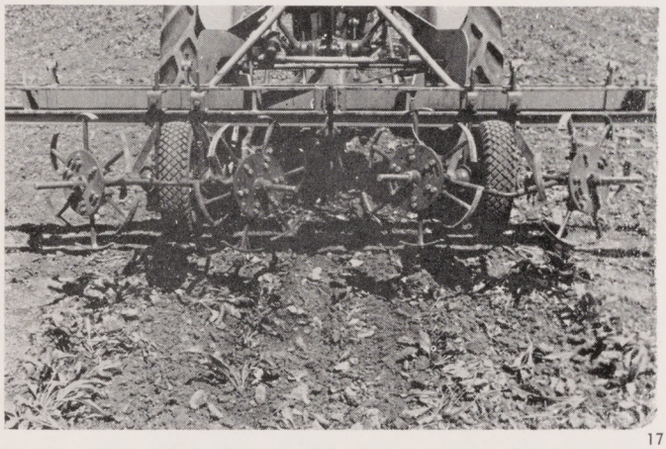
THINNING AND HOEING — major cost items n growing a beet crop can yield to Mechanization if growers are willing to try something new and accept the philosophy of "Random Stand Reduction."

DOWN-THE-ROW BLOCKERS



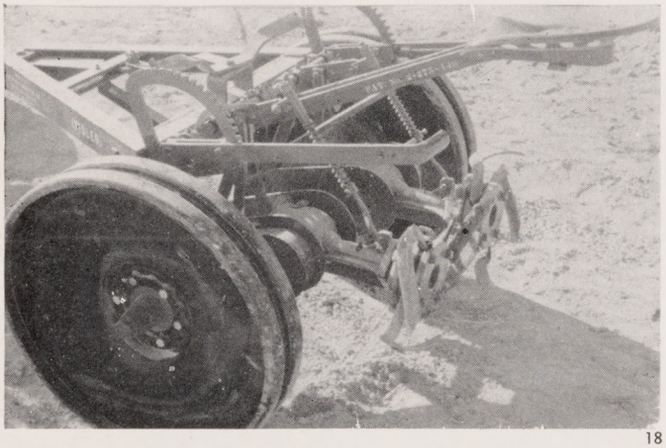
16

The Cropmaster Blocker's knives wig-wag across the rows as the tractor moves forward. Made by Winter-Weiss Company, Denver.



17

The Milton Blocker, made by the Edwards Equipment Company, Yakima, Washington, mounts on the tool bar and is ground powered.



18

The Dixie Blocker needs no introduction. It has been used in California beet fields since 1941.

MODIFIED DIXIE COTTON CHOPPERS



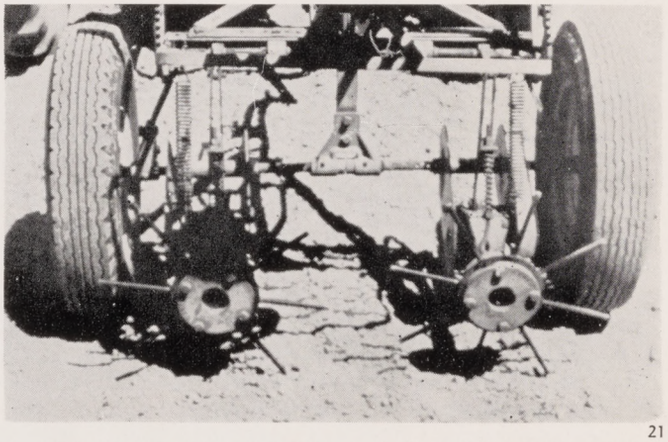
19

In 1948 the Colorado A & M College developed this rotary spring finger weeder to replace the knives on the Dixie Blocker.



20

This is a closer view of the attachment shown above. Owners of Dixie Blockers might like to borrow this idea.

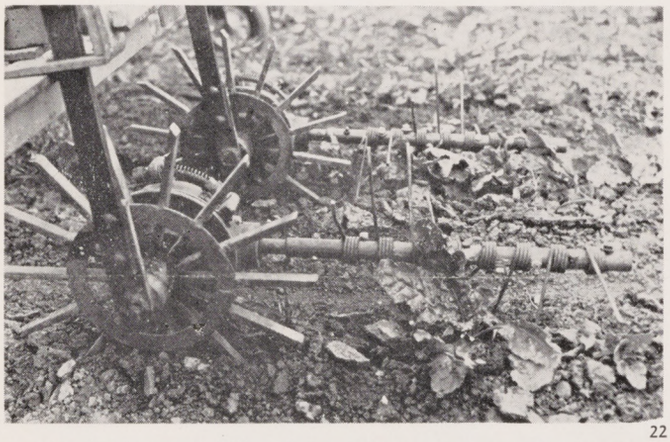


21

The Dixie Weeder is an attachment made by the Dixie Cotton Chopper, Dallas 9, Texas. Can be used for random thinning.

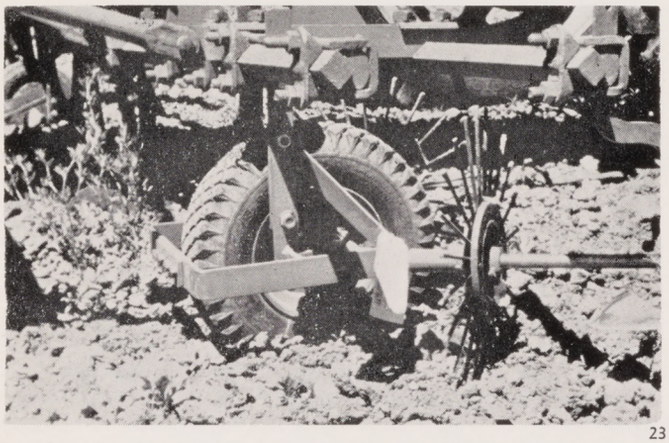
Many of the machines pictured here are in current use by beet growers East of the Rockies. Photographs courtesy of the Beet Sugar Development Foundation (except those in the two lower corners).

SPECIAL WEEDER-THINNERS



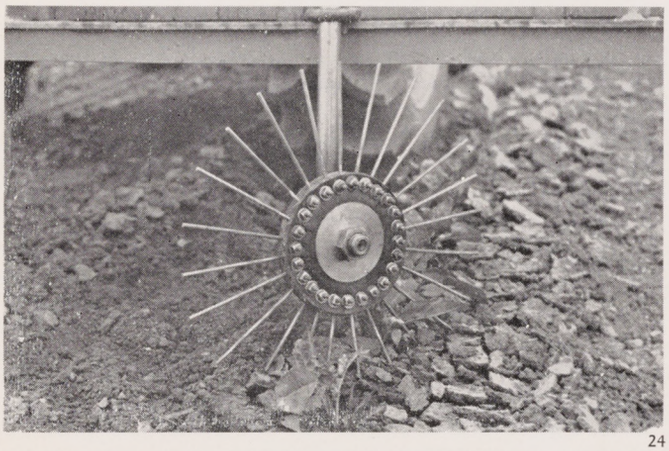
22

The Winpower Ro-Tiller, designed for weeding corn, has proved effective in sugar beets, for weeding and stand reduction.



23

The Edwards Manufacturing Company developed this spring tined weeder-thinner rotor for their Eversman blocker.



24

This experimental weeder-thinner is self-powered by its partial rolling action. It is a promising idea, attractively simple.

STANDARD TOOLS IN A NEW ROLE



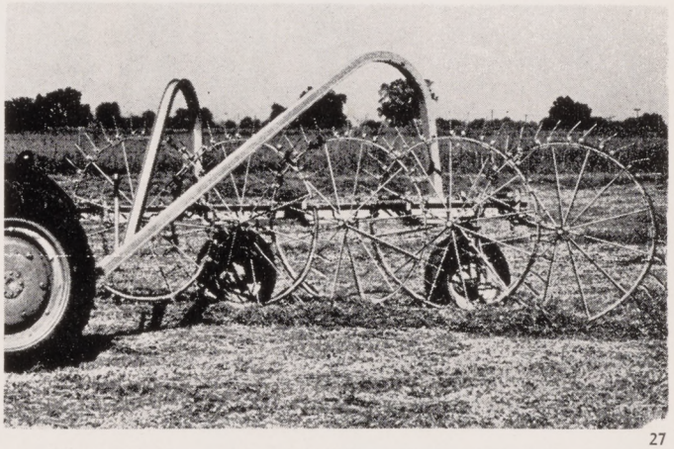
25

When beets are planted flat, the "Finger Weeder," driven across the rows performs a field-proved job of stand reduction.



26

An ordinary side delivery rake is the most available for the random stand reducers and it does a good job on mellow soil.



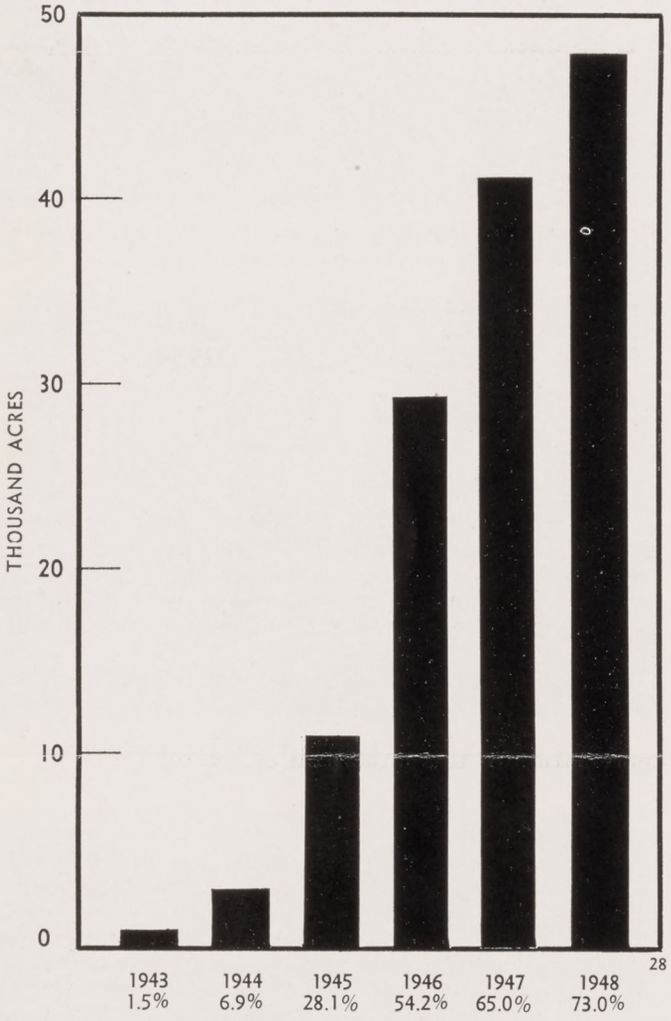
27

The Morrill Rake is made in Tulare, California. While never tried as a weeder-thinner, it looks like a promising tool.

THE 1948 HARVEST IN REVIEW

For the last five years this column has appeared annually in the Sugar Beet Bulletin under a heading bearing the term "Mechanical Harvest." Dropping the word "Mechanical" is probably this year's biggest harvesting news, for when we say "Harvest" in California, it now goes without saying that it's mechanical.

True, we can point to the bar chart below and say that our harvest is not 100% mechanized. But in reality, it's about as completely mechanized as it is likely to become unless a method is developed to harvest the smaller acreages economically by machine.

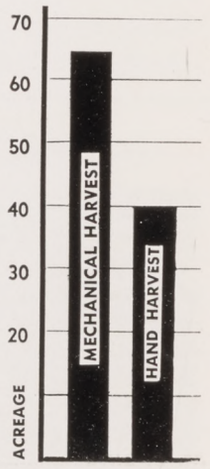


THE SMALL ACREAGE CONTRACT

An analysis of contract acreages in terms of harvest method reveals that the average hand harvested contract is much smaller than the average mechanically harvested contract. The tabulation by districts is shown below.

	Sacramento Dist.	Salinas Dist.
Average Hand Harvested Acreage	57.5	24.7
Average Mechanically Harvested Acreage	78.2	50.3

The bar chart at the right shows graphically the average for all districts, and points up the small grower's need for some means of reducing costs through mechanization.



There are two ways for the smaller grower to cut costs. One is to avail himself of commercial harvesting contractors. This is particularly true of the small contract planted on two-row beds. Until an inexpensive, low draft two-row harvester suitable for bed work is developed, the commercial operator is indicated for the small contract planted on two-row beds.

The grower who elects to plant his small acreage in evenly spaced rows, either on the flat or on single-row beds should be alert to the availability of single row harvesters. The major implement manufacturers either build or contemplate building single row beet harvesters. John Deere and International have been in the field for several years. Allis-Chalmers, Dearborn Motors (Ford) and Ferguson are all considering the early introduction of beet harvesters for attachment to their wheel tractors.

The Marbeet harvester accounted for most of the 1948 acreage in California. Basically unchanged since 1945, this heavy-weight acquired a record number of useful accessories in 1948. Defoliators, Top Windrowers, Elevator Extensions and Ground-Wheel Drives were widely adopted. These accessories contributed toward more complete pickup, cleaner loads and improved top recovery.

There was no letup in the continuous experimental program jointly conducted by the Spreckels Sugar Company and the Blackwelder Manufacturing Company. The most encouraging outcome of the program was the development of a disk topper and trash eliminator for the two row machine. Both are attachable to existing machines with a minimum of alteration but neither should be installed without consulting the manufacturer, since performance is optimum only under proper field conditions.

Many growers purchased their own harvesters in 1948, while others depended upon commercial operators for their harvest. Thus the Spreckels rental program provided a reduced number of machines in 1948. The table below demonstrates this trend.

	Per Cent of Total Harvested Acreage	
Method of Harvest	Sacramento Dist.	Salinas Dist.
Grower-owned Machines	36%	32%
Commercially operated Machines	13%	45%
Company-rented Machines	20%	2%
Hand Harvest	31%	21%

The reliance upon grower-owned or commercially operated machines was much strengthened in 1948, and indicates a healthy acceptance of machine harvest, with growing realization of its many economies and conveniences.

The 1948 Honor Roll

Spreckels growers whose contracts yielded 25 tons per acre or more are here listed. Congratulations—you have produced outstanding crops in the face of one of California's poorest growing years.

Grower	Tons Per Acre	Lbs. Sugar Per Acre
MR. AVERAGE CALIF. GROWER	**16.00**	**4,928**
F. D. Willoughby & Son	35.13	10,273
W. R. Stephenson & Son	34.87	10,705
Ernest Carstens	32.99	9,092
Matteucci Bros.	31.58	9,562
Charles S. Gubser	31.21	10,050
M. G. DaRosa	31.15	8,630
C. W. & W. J. McGowan	31.04	10,505
M. B. Silva	30.79	9,379
Peter & Arnold Breschini	30.58	8,391
Peter Fanucchi	29.34	9,939
Irvin Dethlefsen	29.15	7,788
Neffs Ranch	29.15	8,401
Gene Kane & Co.	29.00	8,968
A. Poloni	28.64	8,828
Swanson Bros.	28.57	7,462
G. G. Guiberson	28.55	9,358
M. H. & W. F. Thomas	28.50	7,529
Frank Dyer	28.46	10,091
Mussi Bros.	28.31	9,257
Waldo Rohnert Co.	28.19	7,871
Arnold Collier	28.09	9,123
Gene Kane & Co.	27.91	9,058
Louis P. Battinich	27.86	9,343
Frick & Gobel	27.48	7,111
Peter Fanucchi	27.29	9,077
Heidrick Bros.	27.06	9,763
Tony Ferreira	27.00	8,056
M. Carden	26.86	8,831
Irvin Dethlefsen	26.84	6,554
Henry Rutz	26.81	8,552
J. H. Hayes	26.80	8,040
Foster Hutchings	26.78	8,715
E. M. Olson	26.66	9,288
Brown & L. & W. Land Co.	26.65	7,386
Irvin Dethlefsen	26.43	6,809
Francis Peixoto	26.41	8,065
R. E. Carden	26.35	7,936
Ice Kist Packing Co.	25.98	7,493
Hitchcock Bros.	25.89	7,461
Curly Top Resistance Br. Com.	25.83	7,310
Antonio Telles	25.79	7,768
Hitchcock Bros.	25.57	7,441
M. S & Joseph Furtado	25.56	7,836
Ralph W. Pollock	25.55	8,574
Kenneth & Marion Gibson	25.54	8,341
Mike Martin	25.46	8,717
Harvey E. Russell	25.41	6,763
Wilbert Rosa	25.13	8,424
Jinnett Bros.	25.06	6,169

PLANT SPACING

(Continued from Page 10)

WEED CONTROL AFTER THINNING

The most expensive single item of spring labor is hoeing. The thinning operation frequently has the effect of exposing to germination an entire new crop of weed seed which germinates most profusely if soil moisture is favorable. The function of first hoeing is usually to destroy those weeds which have germinated after thinning.

PROPER CULTIVATION CAN ELIMINATE FIRST HOEING

It would appear that the usual cultivating tractor operator is a little hazy as to just why he drives his tractor up and down the crop rows. Unless the man on the tractor really understands all of the functions of cultivating, he may be doing nothing more than taking a long ride up and down the field. There is one very important function of cultivating which seems to have been forgotten. This is the throwing of pulverized soil into the crop rows so as to cover with soil the small weed seedlings which have germinated between the crop plants. Merely passing along the crop rows with a series of disks, sweeps and shovels can at best only destroy those weeds actually in the path of the cultivating tools. When, however, the surface soil with its crop of little weed seedlings has been thoroughly pulverized, carefully adjusted shovels can be made to ridge up this pulverized soil into the beet rows. The beet seedlings can even be partly buried. So long as there is a clump of leaf tips open to the sunlight, these will carry on the normal growth of the beet plant. In the meantime the intervening weed seedlings will perish under the covering of soil.

There is nothing revolutionary about this type of cultivating, but it is doubtful if many of our tractor drivers or even ranch superintendents possess a real appreciation of this important cultivator function.

THE SPRECKELS EXPERIMENTAL PROGRAM

The Agricultural Department of the Spreckels Sugar Company hopes that many growers will try out some of the suggested methods of spring mechanization. However, the Company has planned a series of experiments to evaluate these methods on a scientific basis. These experiments resolve themselves into three general headings, as follows:

1. Mechanical Stand Reduction
2. Mechanical and Chemical Weed Control
3. Late Season Water Grass Control

The first two subjects will employ equipment very much as described above. The water grass control program, however, will involve the design and field trials of a number of new devices for both spraying and cultivating between the crop rows after the crop plants have attained a large size. The outcome of these experiments will be discussed in future issues of the Spreckels Sugar Beet Bulletin.

MORE BEETS PER ACRE

(Continued from Page 11)

where the farming is done on soils of high fertility level.

There has been no such upward trend in the Sacramento and San Joaquin Valleys. Average stands still remain at from 90 to 100 beets. With the increased use of fertilizers and better crop rotations, it is very doubtful that such low populations per acre are giving growers their maximum returns.

Why are the stands low? Dr. H. Rietburg, sugar beet expert of Holland, writing in the British Sugar Beet Review, commented on that question.

"I must say that in my opinion many British farmers could easily improve their tonnage per acre by improving the plant population. I know many people think that to grow a high population is difficult, but in reality when a grower from the moment he starts preparing his seed bed is "population minded," he will usually obtain the high population with relatively small exertion and this will always be paid for by his higher yield."

Being "population minded" as emphasized in the above statement would mean watching the following specific points:

1. Do a good job of seed bed preparation.
2. Plant plenty of seed to assure an adequate stand with a minimum of skips.
3. Do whatever is necessary and timely to help seedling emergence, such as rolling, irrigation, etc.
4. Supervise your thinning closely. Be sure your labor is leaving enough beets and check them continually. The labor contractor is not the man to take this responsibility.
5. Watch your cultivation. Loss of plants through careless cultivation can be a serious factor in reducing stand.

In arriving at higher populations per acre there is a limit that should not be exceeded. Yields will eventually go down with too many beets. However, from tests run in our own state stands of from 120 to 140 beets per 100 feet of row (30,000 to 40,000 beets per acre) would not be excessive. Distribution of the stand down the row will have some effect, but its importance is not as great as many growers believe. Deming, McBirney, and Mervine of the U.S. Department of Agriculture have demonstrated many times that non uniformity of spacing has negligible influence on yields so long as no more than two beets per hill are permitted to grow.

OUTLOOK FOR CROPS

(Continued from Page 11)

this state this year could be important in determining the level of price supports.

Production of alfalfa hay and feed grains might increase some this year. Prices in both cases might be down from 1948. At current levels of demand for livestock and livestock products, some increase in alfalfa hay production could be absorbed at favorable farm prices. California farm feed grain prices are related closely to United States farm prices, and the outlook is for a decline in United States feed grain prices this year.

For crops generally, production expenses could continue high this year, and, thus, net income might be off from 1948.

Beyond 1949, the outlook for crops competing with sugar beets becomes more obscure. A significant part of the acreage released from Irish potatoes this year might well go to cotton. Wheat may also come in for some increase. However, a very substantial reduction in cotton acreage in 1950 is probable under the mandatory government price-support program. Wheat may not absorb much of the acreage so released, since acreage allotments are also a possibility here. The same may be in prospect for Irish potatoes again in 1950. Under these circumstances a substantial acreage may be released for the production of some of the other crops mentioned—alfalfa hay, feed grains, and tomatoes and other truck crops. Even if the general level of economic activity continues high, this increased production could exert a depressing influence on price. Production of alfalfa hay and feed grains (primarily barley and perhaps Indian corn) could increase substantially in this process of adjustment. Tomatoes and other truck crops (and possibly wheat) might come in for lesser increases.

The prospect of increased production of alfalfa hay and feed grains should be considered in conjunction with the outlook for livestock and livestock products. Current livestock-feed price ratios are favorable to the feeding of livestock. Assuming a continuance of high level consumer income, livestock-feed price ratios may continue favorable to livestock feeding. Under these circumstances, some expansion in a grain-livestock enterprise combination may be in prospect.

THANK YOU AGAIN

The business reply cards in the January-February issue of the Sugar Beet Bulletin brought forth a most gratifying response.

20.5 per cent of you filled out and mailed the cards (6% is par for this sort of thing).

98.4 per cent of the replies told us to continue sending the Bulletin.

89 per cent of the replies told us that you have saved past issues of the Bulletin.

43 of you wrote complimentary notes of appreciation.

All of this makes us very happy. We promise to earn your good will by redoubling our efforts to make the Sugar Beet Bulletin as interesting and informative as we can.

Thank you again,

Austin Armer Editor.

The SPRECKELS SUGAR BEET BULLETIN is published bi-monthly by the Agricultural Department of the Spreckels Sugar Company as a service to its growers.
AUSTIN ARMER, Editor 600 California Fruit Bldg., Sacramento, Calif.

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SPRECKELS SUGAR BEET BULLETIN

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. XIII MAY-JUNE 1949 No. 3



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WATER, FERTILIZER AND BEETS

High yields of sugar beets depend on more than fertile soil or ample irrigation.

IRRIGATION METHODS

FERTILIZER APPLICATION

BEET POPULATION

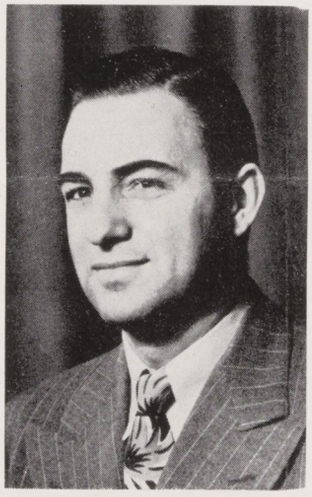
Are all closely inter-related. Their correct balance leads to outstanding yields.

HONEY-DEW

SUGAR BEETS REQUIRE PLENTY OF MOISTURE AND FERTILIZER

By OMER J. KELLEY[1]

Editor's Note: This article appeared in THROUGH THE LEAVES, November-December, 1948. We are indebted to the Great Western Sugar Company and the author for publication permission.



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During recent years sugar beet growers have used more fertilizer than ever before. Increased use of fertilizer does not necessarily insure increased yield of beets. Why? The answer is that there are many factors which affect sugar beet production other than fertilizer. The more important of these factors which are under the control of the farmers are: moisture level, number of beets per acre (including spacing of plants), variety of beet, date of planting, and cultural practices. If the beet farmers are to obtain a maximum yield, it is necessary that as many of these factors as possible be near optimum.

Let us assume that the farmers are using the right variety of beets and that their cultural practices are at least good, if not optimum. Considerable research has been done on date of planting in relation to yield. Data by Deming[2] indicate that as much as six tons of beets per acre may be lost by one month's difference in planting date. This was equivalent to about one ton of sugar per acre. We probably can assume that under average conditions of fertility, moisture, and other management practices that the best date of planting is relatively well known.

It is a little surprising to most beet growers to know that the average yield of beets in the United States in 1944 and 1945 was only 12.1 tons per acre. The average yield of beets per acre and the average tons of sugar per acre in California, Utah, Colorado, and the United States for 1944 and 1945 are given in Table 1.

TABLE 1.—AVERAGE YIELD OF BEETS AND TONS OF SUGAR PER ACRE FOR 1944 AND 1945[3]

	1944 and 1945 Average Acreage 1,000 Acres	1944 and 1945 Average Production 1,000 Short Tons	1944 and 1945 Average Yield Tons Per Acre	1944 and 1945 Average Tons Sugar Per Acre[4]
California	83.5	1404.0	16.8	2.41
Colorado	134.5	1631.0	12.1	1.87
Utah	31.5	416.5	13.2	1.76
United States	637.0	7711.0	12.1	1.71

The yield for the entire Spreckels Sugar Company territory in 1948 was as follows:[5]

Tons of beets per acre, 18.03 — Tons of sugar per acre, 3.00

To the best sugar beet growers even these are poor yields. Without a doubt a majority of the farmers could obtain increased yields from a number of improved practices. But what about the beet farmers who are getting yields of beets above the average? Have they reached a maximum?

A STUDY OF INTER-RELATIONSHIPS

Let us look at an experiment recently conducted to study the inter-relationships of moisture, spacing, and fertility of sugar beets. This experiment was conducted in Utah,[6] and is reported in the Proceedings of the American Society of Sugar Beet Technologists for 1948. There were three spacing of plants in this experiment—plants spaced 12 inches apart in the row and row width which varied as follows: 24 inches apart, 20 inches apart, and on ridges 12 by 20 inches apart.

The fertility treatments involved variations in nitrogen, phosphorus, potassium and manure. In so

[1] Principal Soil Scientist, Bureau of Plant Industry, Soils and Engineering, U.S.D.A., Colorado Experiment Station, Fort Collins, Colorado.

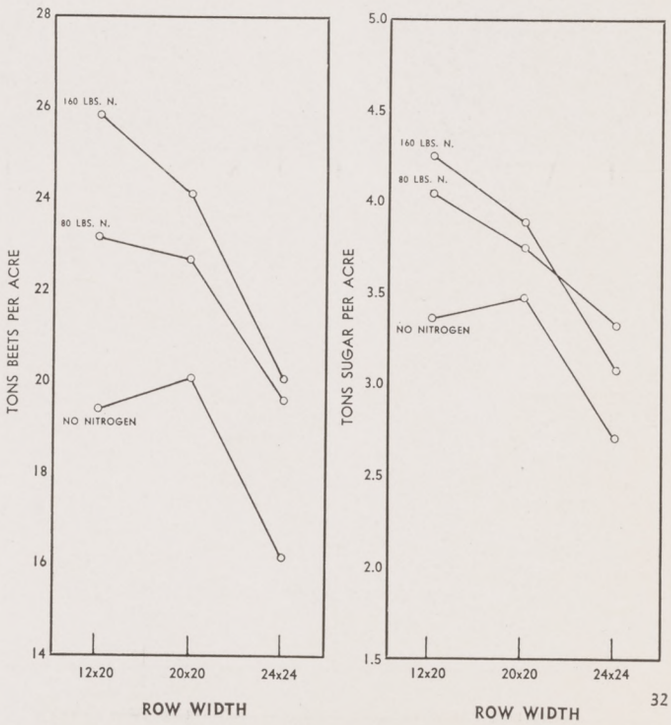
[2] Deming, G. W., Relative Yields of Reduced Stands of Sugar Beets Planted at Normal Date and of Replanted Beets. American Society of Sugar Beet Technologists, 1942, pages 1-6.

[3] Agricultural Statistics, 1946, U. S. Department of Agriculture, p. 92.

[4] Subject to some error since some beets are processed in states other than where they are produced.

[5] According to Company records reported by Austin Armer, Agricultural Engineer.

[6] Haddock, J. L., and Kelley, Omer J. "Inter-relationships of Moisture, Spacing and Fertility to Sugar Beet Production." Proceedings American Society of Sugar Beet Technologists. 1948.



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Fig. 1—Moisture Treatment No. 1, 15 Tons Manure

far as this report is concerned, we will consider only the variations in nitrogen which were O, 80, and 160 pounds of nitrogen per acre, and variations in manure which were O and 15 tons of manure per acre.

There were four moisture variables as follows:

Moisture treatment No. 1—plots kept continuously moist, or at a low moisture tension—6 irrigations.

Moisture treatment No. 2 — continuously moist until August 5; no irrigations thereafter—3 irrigations.

Moisture treatment No. 3—After July 15 plots were allowed to reach wilting percentage at the 18-inch depth—3 irrigations.

Moisture treatment No. 4—after July 15 plots were allowed to reach wilting percentage at the 30-inch depth—3 irrigations.

All plots were sprinkler irrigated on June 26 and July 15, at which time differential irrigations were commenced. The irrigation dates for the moisture treatments were as follows:

Moisture treatment No. 1—June 26, July 15, August 1, August 12, August 23, September 4.

Moisture treatment No. 2—June 26, July 15, and August 5.

Moisture treatment No. 3—June 26, July 15, and August 26.

Moisture treatment No. 4—June 26, July 15, and September 4.

RESULTS OF THE STUDY

Figure 1 shows the effect of variations in nitrogen and width of row for moisture treatment No. 1 (wet treatment) at the 15-tons of manure level in tons of beets per acre and tons of sugar per acre.

It is observed in Figure 1 that the maximum response of nitrogen came from the closest spacing, and that the highest yield was 26 ton of beets. This same treatment produced about 4.2 tons of sugar per acre. As the row width increased, the beneficial effect of added nitrogen decreased.

Figure 2 shows the effect of three levels of nitrogen at each of three moisture levels on tons of beets per acre and total sugar per acre. The data in this figure are only for the thick spacing and 15 tons of manure treatment. The maximum benefit from the increased fertilizer was obtained from the wet-test plots. For the drier plots, there apparently was not sufficient moisture to utilize the increased fertility.

Figure 3 shows the effect of manure treatments at three levels of nitrogen fertilization for the wet-test moisture treatment (No. 1) and the close spacing of plants on tons of beets and tons of sugar per acre. It will be observed that increased yield in tons of beets was obtained by increasing the nitrogen level. The highest yield was for the high nitrogen treatment. Similar increases were obtained in tons of sugar per acre.

WHAT THIS MEANS TO THE BEET GROWER

A study of these three figures points out a very interesting relationship in so far as high yield of beets is concerned. It can readily be seen that the high levels of commercial fertilizer had the greatest effect where moisture was adequate and where there was a large number of plants per acre.

(Continued on Page 24)

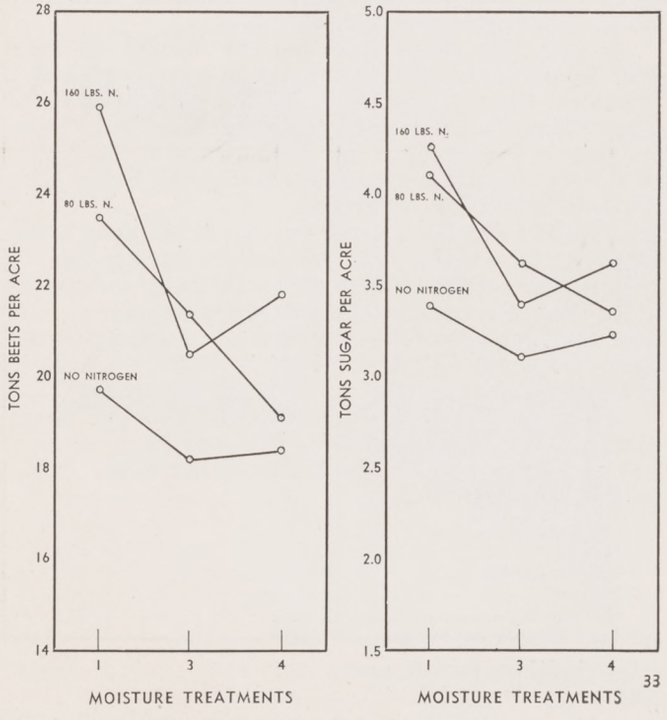


Fig. 2—12" x 20" Spacing, 15 Tons Manure

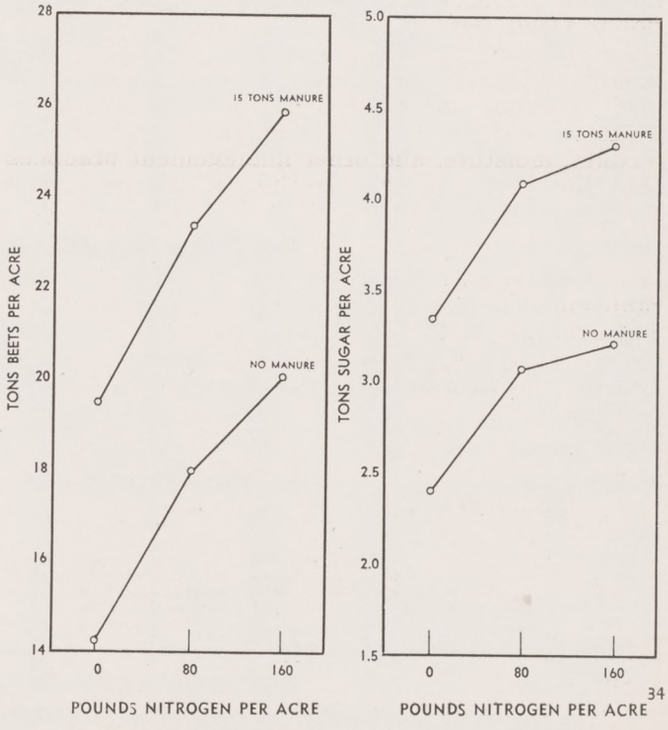


Fig. 3—12" x 20" Spacing, Moisture Treatment No. 1

PUMPED WATER IS CHEAP WATER

By JOSEPH K. CANNON

Pump Test Engineer, Pacific Gas and Electric Company

Many growers have been practicing economy in the use of water because of (1) restricted local supplies and (2) through a sense of false economy.

This false economy group reason that if the water levels have dropped so that their pumping lift has increased 20, 30 or even 40 percent, they must economize on the use of water because their cost of pumping water has increased in direct proportion to the increase in lift.

In following this line of reasoning, they are very much aware of one factor (Lowering water tables), but are overlooking a great many other factors.

Comparing today's pumping costs and conditions with those of 15 or 20 years ago, we should consider other important factors that will affect the cost of water. These other factors include rate reductions, increased load factors (increase in total hours per year usage) that permit operation in cheaper energy blocks, improvements in pump design and resultant improved efficiencies because of an increase in the number of stages or bowls required for the higher lifts.

The accompanying bar charts show the trend in water table levels in various sections of California. They demonstrate vividly that water levels today are below those of 15 or 20 years ago.

Now, let's review electric rates under the Pacific Gas and Electric Company P-3, or Agricultural Power Schedule. Below is a tabulation of the last three major changes in the P-3 schedule:

SCHEDULE P-3 — Date Effective April 1, 1935

Connected Load		Annual Service Chg. per HP	First 1000 KWH/HP	Next 1000 KWH/HP	All Over 2000 KWH/HP
2-4	HP	$6.50	1.6c	.8c	.7c
5-14	"	5.50	1.4	.8	.7
15-49	"	5.00	1.2	.8	.7
50-99	"	4.50	1.1	.8	.7
100-249	"	3.90	1.1	.8	.7
250-499	"	3.75	1.05	.8	.7
500-999	"	3.60	1.	.8	.7
1000-2499	"	3.30	1.	.8	.7
2500 HP or over		3.00	1.	.8	.7

SCHEDULE P-3 — Date Effective July 1, 1939

2-4	HP	$6.25	1.6c	.8c	.7c
5-14	"	5.25	1.4	.8	.7
15.49	"	4.75	1.2	.8	.7
50-99	"	4.25	1.1	.8	.7
100-249	"	3.75	1.1	.8	.7
250-499	"	3.75	1.05	.8	.7
500-999	"	3.60	1.00	.8	.7
1000-2499	"	3.30	1.00	.8	.7
2500 HP and over		3.00	1.00	.8	.7

SCHEDULE P-3 — Date Effective April 15, 1946

1-4.9	HP	$6.25*	1.45c	.7c	.5c
5-14.9	"	5.25	1.25	.7	.5
15-49.9	"	4.75	1.15	.7	.5
50-99.9	"	4.25	1.05	.7	.45
100-249.9	"	3.75	1.05	.7	.45
250-499.9	"	3.75	1.00	.7	.45
500-999.9	"	3.60	.95	.7	.45
1000-2499.9	"	3.30	.95	.7	.45
2500 HP and over		3.00	.95	.7	.45

* In no case will the total annual service charge be less than $12.50 for single-phase service, nor less than $18.75 for three-phase service.

Comparing the 1935 rate with the present rate, we see that a 25 HP plant that used 25,000 KWHr's per year had a total bill of $425 in 1935 as against $406.25 in 1948, or a reduction of 4-1/3 percent.

The same plant using 45,000 KWHr's per year would have had a bill of $585.00 in 1935 as against $546.25, or a reduction of 6.62%.

Prior to 1935, a pumping plant with an overall efficiency of 50-55% was considered an efficient plant. Today we expect new plants to range from 60-65 and even 70 percent in overall efficiency.

A 50% plant as compared with a plant of 65% overall efficiency would use a little better than 20% more energy to do the same job.

Many pumps in the past were bought and sold on a rule of thumb requirement of 1 HP per acre. 20 Acres — 20 HP. No consideration was given to the amount of water that the well could economically supply, or to the fact that a smaller pump running longer hours would do the job just as well and a lot cheaper. This uneconomical practice made many pumping bills higher than they should have been. In the past 15 to 20 years, the majority of these older pumping plants have been changed to more modern and efficient ones either because of wear or through the testing service and advice given by P. G. & E. pump test crews.

The resultant savings have, in many cases, more than offset any increased costs due to increased lifts caused by lower water tables.

In support of the argument that the cost of pumping water has changed very little in spite of lower water tables, let's take a look at a few specific examples.

The average pumping lift in the Arvin area in 1938 was 232 feet, and the cost per acre foot of water $2.87. For the year 1948, the average pumping lift had increased to 313 feet, or an increase of about 35%. The cost per acre foot of water in 1948 was $3.23, or an increase of about 12.5%.

During this 10 year period, the number of kilowatt hours required to pump an acre foot of water increased from 383 to 513.7. This increase tended to place a larger portion of the total kilowatt hours used per year in the cheaper rate blocks, and consequently, the customers average rate was much lower than it would have been otherwise.

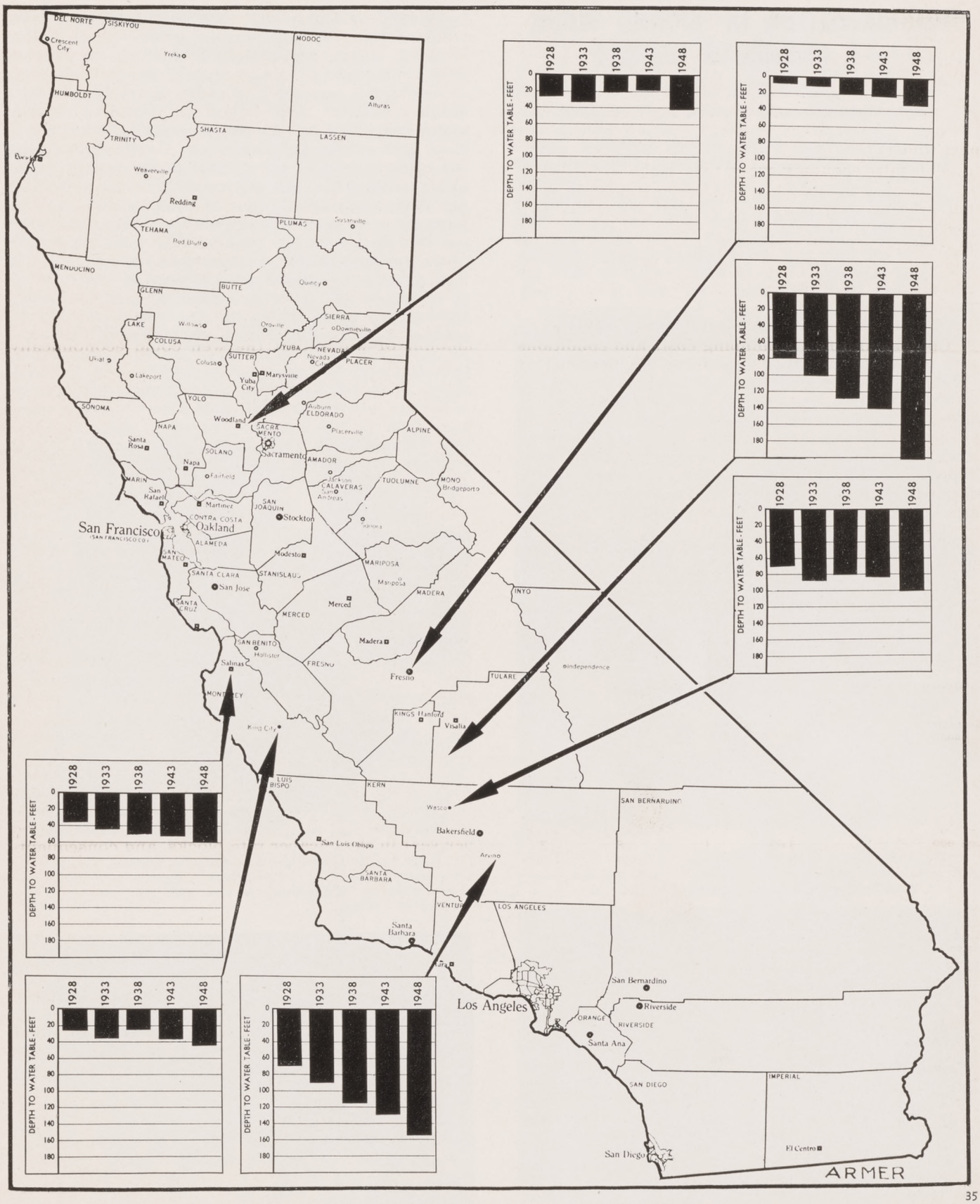
Additionally, the farmers in the Arvin area benefitted by two major rate reductions during this 10 year period, which contributed materially to holding down their pumping costs. Interestingly enough, the unit cost per acre foot of water per foot of lift decreased from a value of $.0124 in 1938 to $.0103 in 1948.

A crop production study on 154.4 acres of sugar beets in the Kern District for the year 1948, showed the cost of power was only $19.20 per acre. Other major cost items were:

Plowing & Preparation	$30.50
Fertilizer	36.90
Irrigation Labor	33.00
Harvest	40.00
Hauling	39.00
Land Charges (rent or taxes & interest)	48.25

Irrigation power costs per acre foot of water pumped averaged $2.42.

(Continued on Page 24)



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A TWENTY YEAR HISTORY OF CALIFORNIA'S FALLING WATER TABLE

The cost per acre foot of irrigation water from deep wells has remained fairly constant over the past 20 years. This has been due mainly to increases in pumping plant efficiency, improved load factor in pump operation and reduced energy charges. The basic problem of California's falling water table can be solved only by replenishment—not by improved efficiency of deep well pumps.

MECHANIZATION OF SPRING WORK —A PROGRESS REPORT

By AUSTIN ARMER

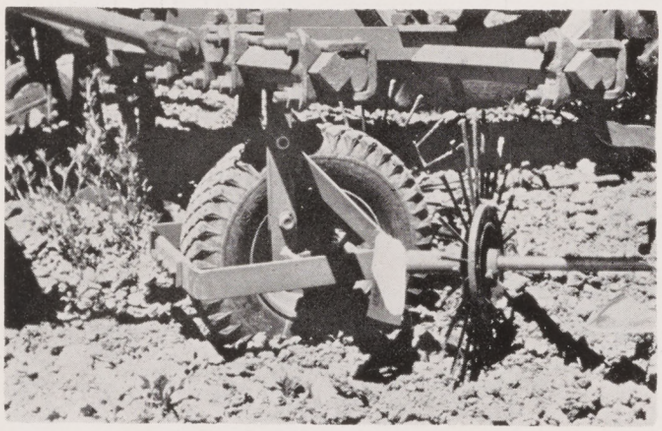
Agricultural Engineer, Spreckels Sugar Company

The March-April issue of the Spreckels Sugar Beet Bulletin featured mechanized thinning and hoeing to reduce the cost of the beet crop. The acceptance of the ideas set forth in that issue of the Bulletin has been so gratifying that it seems best to follow up the subject with a report of accomplishments to date. By the time this issue is in the hands of growers, there will still be quite a number who have not yet started their thinning, and who may benefit from recent findings.

Interest has been particularly keen throughout the Salinas Valley. There are some very good reasons for this, among which must be included the zealous promotional work by Farm Advisor A. A. Tavernetti, and the vigorous sales efforts of equipment distributors in the King City area.

In the March-April issue of the Bulletin a considerable number of thinning and weeding tools were suggested. But recent field experience has somewhat limited the number of practical tools for California conditions. Some of the most promising work has been done by Milton and Eversman blocker-weeder combinations. It has become evident that unless seedling stands are unusually uniform in spacing with a minimum of closely spaced plants, some form of blocking is necessary in order to get an adequate stand reduction. Our hopes for complete random stand reduction by the use of weeding tools alone have been pretty well destroyed. On the other hand the effectiveness of the weeder in destroying weeds in the rows which are inaccessible to the cultivator has been most gratifying. At least twenty growers have made more or less large scale trials of mechanical thinning over the past months and the results align themselves into a somewhat definite pattern. The present complaint on blockers is that wheras they can be set to leave sufficient beet-containing blocks, too many of the latter consist of multiple plants. It seems that almost regardless of the stand or block setting, the tendency is to leave blocks containing about 1/3 singles, 1/3 doubles, and 1/3 multiples. There is abundant experimental evidence to show that the doubles will yield about as much sugar per block as the singles. However, when three or more plants occupy the same block there is a strong tendency to produce a clump of fingerlings of almost no value at harvest time.

(Continued on Page 24)



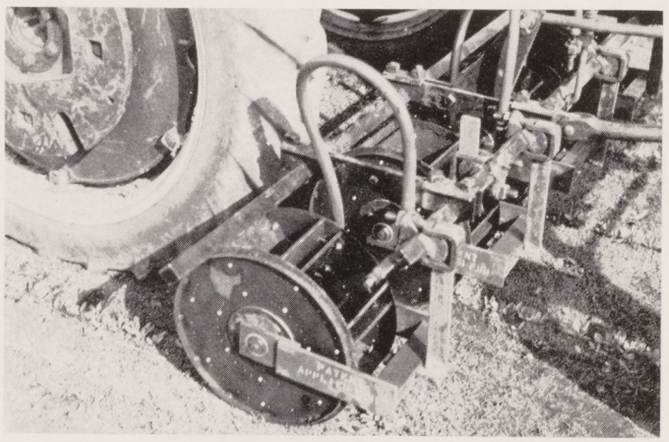
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The Milton Weeder (erroneously captioned "Eversman" in the March-April issue) effectively destroyed weeds in the rows, and also reduced the beet stand by about 30% for each passage over the rows.



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The Milton Blocker left accurately spaced blocks which contained about equal numbers of single, double and multiple plants.



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Henry Lea of Blackwelder Manufacturing Company developed this spray blocker. The rolling "Paddle Wheels" carry a series of shields which protect transverse strips ocross the rows, while all vegetation is killed between these strips.



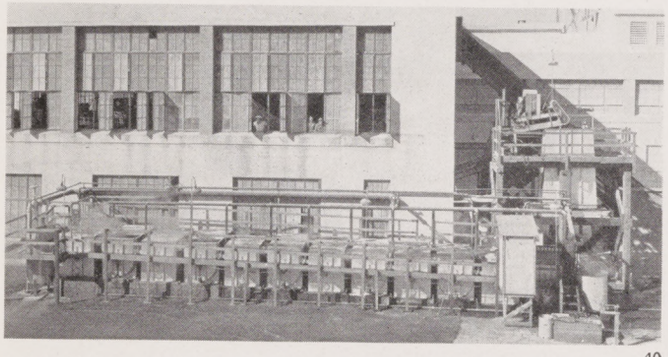
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When conditions are favorable, the spray blocker does a true thinning job. (Above, spray-blocked. Below, original seedling stand.)

BEET RECEIVING CAPACITY TO BE INCREASED

By J. E. COKE
Vice President, Spreckels Sugar Company

Spreckels Sugar Company expects to increase the slicing capacity of its three factories for the 1949 campaign by approximately 1,000 tons of beets per day. This increased capacity will be made possible through the installation of new continuous diffusion batteries at the Company's Woodland and Spreckels factories. This new battery, known as the Oliver-Morton continuous diffusion battery, is an invention of Mr. W. B. Morton, a former employee of the Company, and was given a pilot plant test last year at the Woodland Factory. This pilot plant, with a daily capacity of 500-600 tons, was so successful and the results so satisfactory that at the close of last year's campaign the Company immediately placed orders for the two batteries to be installed for the 1949 campaign.



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The pilot installation of the Morton Battery at the Woodland Factory.

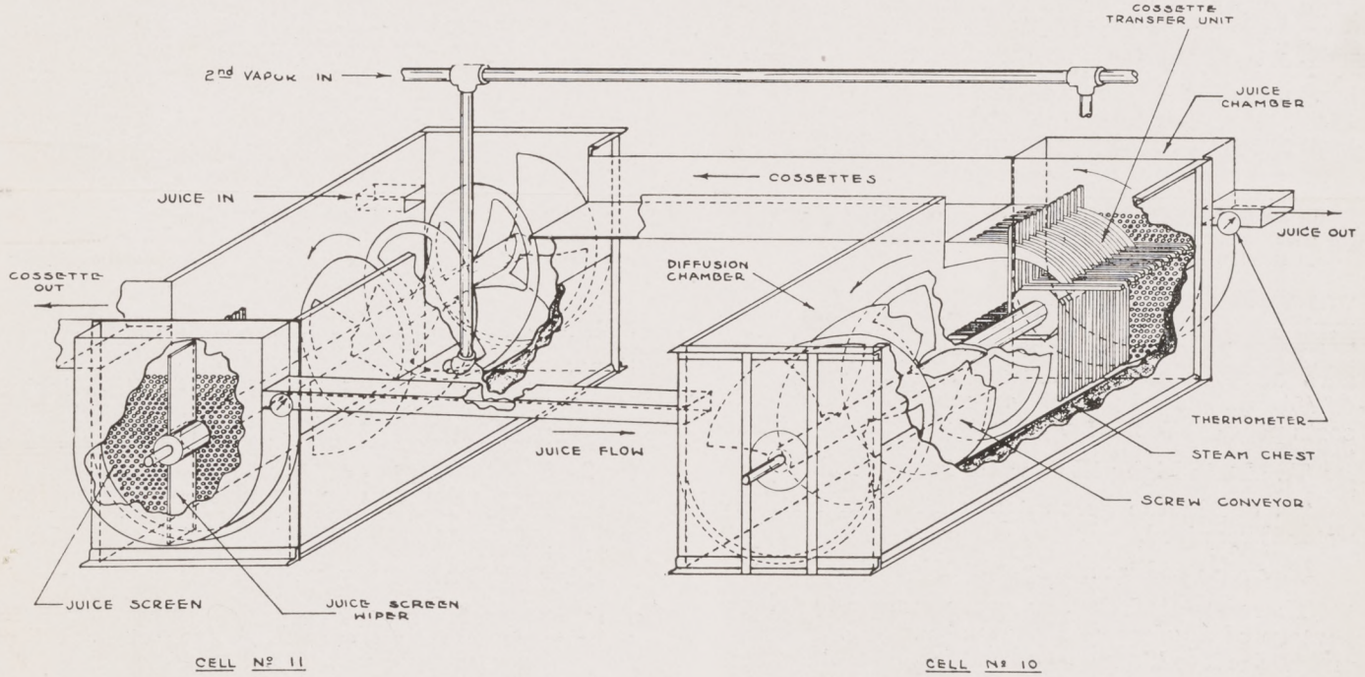
We have always attempted to operate our factories at maximum slicing capacity, not only because of the efficiency of operation which it provides the Company, but because we fully realize the importance to the grower of being able to utilize harvest equipment and crews to their maximum capacity and to complete harvest previous to fall rains. It is with considerable satisfaction, therefore, that we are able to provide this additional capacity at our factories. We expect in the near future to increase further the capacity of our factories to receive and to slice beets, and these plans are a part of our 8 1/2 million dollar factory improvement program, which we hope to complete within a very short time.

(Continued on Page 24)



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A detail of two cells of the Morton Battery.



MORTON BATTERY CELLS

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Schematic diagra m of two adjacent cells of the Morton Battery.

SUGAR BEETS REQUIRE

(Continued from Page 19)

It also can be seen that increasing the number of plants was beneficial only when there was optimum moisture and fertility conditions. It is also obvious that the maximum effect of increased moisture came only with the high level of nitrogen. In all cases manure increased the yield of beets.

The data in these figures emphasize the fact that if one is to approach the maximum use of fertilizer, it is necessary to have adequate water. It is obvious that correct conclusions would have been difficult to arrive at with respect to fertilizer treatments had this experiment been conducted at only one moisture level.

Likewise, if moisture variables were studied on soil of low fertility, one might erroneously conclude that increased moisture would be of little or no effect on sugar beets.

The data presented point out the need of having optimum conditions for the various factors affecting plant growth. If one is to obtain a maximum return from added fertilizer, it is obvious that there must be a fairly complete use of all the fertilizer added. One could not expect a maximum production unless the soil moisture is adequate at all times. It is only when the best combination of all factors affecting plant growth are brought together that the farmers can expect maximum economic production.

PUMPED WATER

(Continued from Page 20)

The ratio of power costs to total production costs was only 6.83%.

A survey of 164 pumping plants on sugar beets and alfalfa in the Woodland area in 1941 showed the average cost of water was $1.70 per acre foot. The average pumping lift in 1941 was 44 ft.

For the year 1948, the average pumping lift had increased to 63 ft. or an increase of 43% over the 1941 value. The average cost per acre foot of water in 1948 for this area had dropped to $1.60.

Increased usage together with a major rate reduction were the important factors in bringing down the cost of water in spite of the increased lift.

While no crop production study on sugar beets was available in 1948, for the Woodland area, a study made on 107 acres of alfalfa in this area showed irrigation power costs amounted to only $4.00 per acre out of a total production cost of $93.75, or 4.27% of the total production cost. Irrigation power costs per acre foot of water pumped averaged $1.60.

To obtain high yields, water is required.

To obtain the greatest benefit from fertilizers, water is required.

To even produce a crop, water is required.

Therefore, it behooves every farmer to take advantage of the fact that pumped water is still cheap and utilize it to his fullest advantage.

MECHANIZATION

(Continued from Page 22)

At this writing it is possible to draw these fairly definite conclusions:

1. Complete elimination of spring labor is possible only if we lower our present standards of thinning and weeding.
2. Reduction (and in rare cases elimination) of thinning labor can be accomplished by a good job of blocking wherein a relatively large number of narrow blocks is left in the row.
3. Elimination of some hoeing labor can be accomplished with existing weeding tools provided that ground conditions permit their effective use.

BEET RECEIVING

(Continued from Page 23)

The problem of increasing the sale of Spreckels beet sugar in the West is also important to beet growers and the Company as it increases the net selling price, which determines the value of sugar beets, as well as benefitting the Company. In addition to our advertising, promotional, and sales work we have installed at our Spreckels factory grinding and sifting equipment for the production of powdered and Baker's special sugar. Also, we will have equipment for the production of liquid sugar at all three factories this year. These three new products —powdered sugar, Baker's special, and liquid sugar —are available to industrial sugar consumers, and because they supply sugar in the form which either offers economy to the users or which is of the type required for the production of specialty items. they result in increased sales of Spreckels sugar in the high netting areas of the West.

Growers may feel assured that our Company will use every means at its command to increase the distribution of sugar in the Pacific Coast.

PLEASE HELP US

We are faced with a problem. One of our veteran growers has made a suggestion for amending the annual Honor Roll so as to give credit for sugar per acre, even though the beet yield might be less than 25 tons per acre.

We think the idea is good. The grower who succeeds in producing unusually high sugar per acre deserves recognition.

But we don't want to amend the Honor Roll without consulting the rest of you growers. So will you help us by sending us your answers to these questions:

1. Shall we extend the Honor Roll to include yields less than 25 tons per acre, provided the sugar per acre exceeds a certain figure?
2. What sugar per acre figure would you suggest as a minimum for admission to the Honor Roll? (We have in mind 7,500 pounds per acre).

May we hear from you?

Austin Armer Editor.

The SPRECKELS SUGAR BEET BULLETIN is published bi-monthly by the Agricultural Department of the Spreckels Sugar Company as a service to its growers.
AUSTIN ARMER, Editor 600 California Fruit Bldg., Sacramento, Calif.

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JUL 7

SPRECKELS SUGAR BEET BULLETIN

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. XIII JULY-AUGUST 1949 No. 4



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GET READY FOR HARVEST

The 1949 sugar beet harvest is only a few weeks away. Now is the time to:

OVERHAUL EQUIPMENT

ANTICIPATE LABOR NEEDS

PLAN BEET TOP RECOVERY

A little planning and preparation will insure a smooth-running, efficient harvest.

DUMP BARS WILL BE ELIMINATED IN SACRAMENTO DISTRICT

To promote personal safety and to reduce dumping time at receiving stations, Spreckels Sugar Company will adopt the uniform policy of requiring that all beet trucks be equipped with slings. When so equipped, all trucks can be dumped by a single hook on the hoist cable, instead of the Johnson bar heretofore used on some of the Northern Dumps.

All Spreckels dumps in the Salinas and Southern San Joaquin Valleys have for several years required sling-equipped trucks. The remaining dumps will require sling equipment starting with the 1949 campaign. These remaining dumps are:

ARGENTA	JOSEPHINE
BOGUE	LIBFARM
CATLETT	MANTECA (Factory 2)
COMSTOCK	MONTEZUMA
CROWS LANDING	RIO OSO
DEL PASO	SHELDON
DIXON	SWINGLE
GRIMES	TULELAKE
HINSDALE	WALNUT GROVE
ISLETON	WOODLAND (Factory 3)

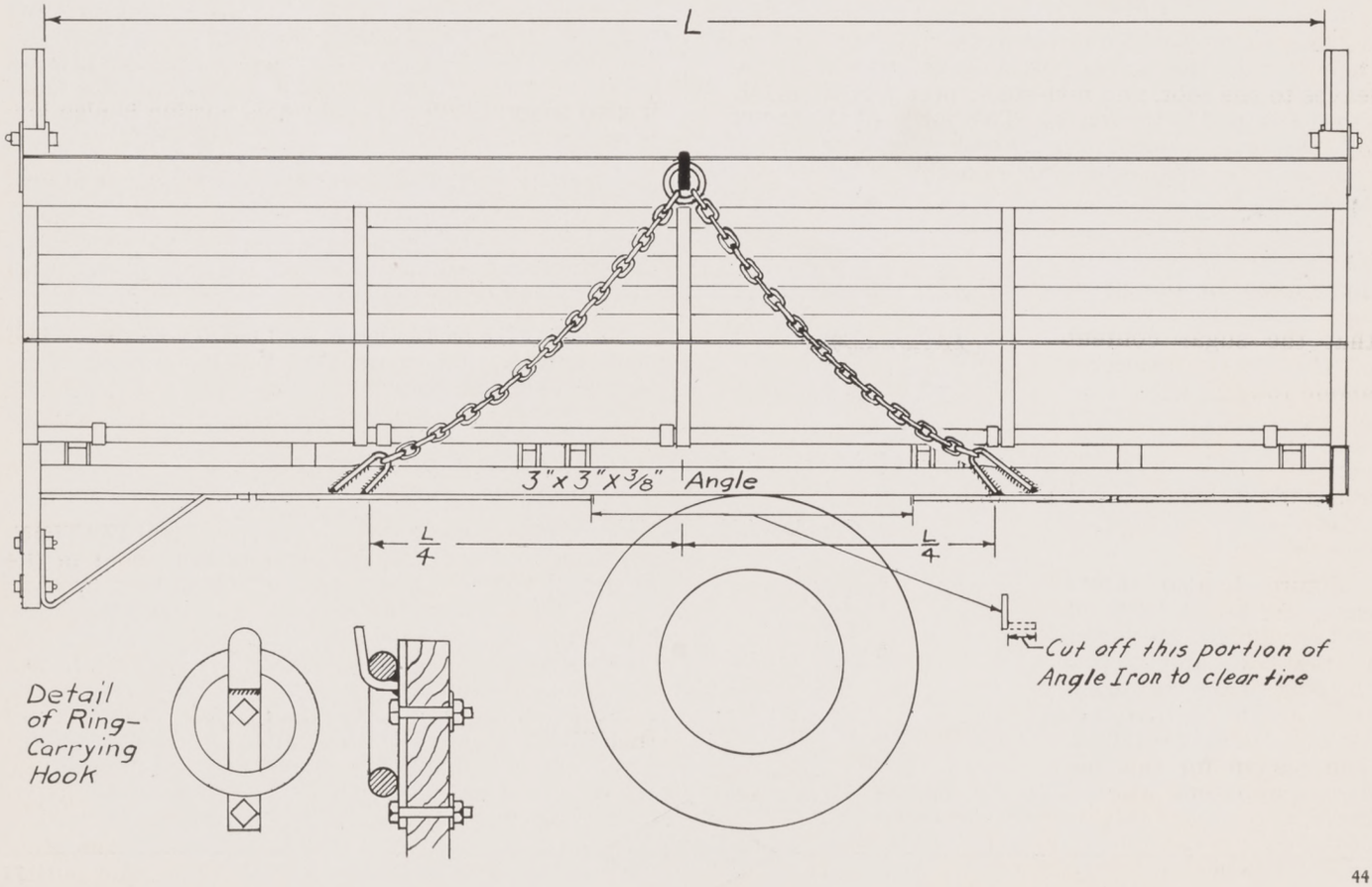
The drawings below illustrate the details of the chain-type sling. One-half inch proof coil chain is recommended for all but the largest beet beds. Two chains will suffice for most beds, but a third chain should be used for beds longer than sixteen feet. The top ring should be forged from three-fourths inch round iron, with an inside diameter of about four inches. (When three chains are required, the ring should be made from one inch round stock.)

When installing three chains, make sure that they are equally loaded. The outer chains should be installed first, stretched fairly tight, and the center chain then tack-welded at its lower end while hanging vertically.

Steel cable can be used as an emergency substitute for chain, but its use is not recommended. It does not hang close to the sideboards, and the stiff loops are dangerous because they may strike or entangle objects alongside the moving truck.

In the case of very large truck beds (those carrying over 15 tons), it is suggested that five-eighths inch chain be used instead of one-half inch chain.

In all cases it is essential that the bottom of the ring be as high as the top of the side board. If it is lower, the side board will be damaged by the hoist hook.



LIFE PROCESS OF THE SUGAR BEET AFFECTS ITS SUGAR CONTENT AND PURITY

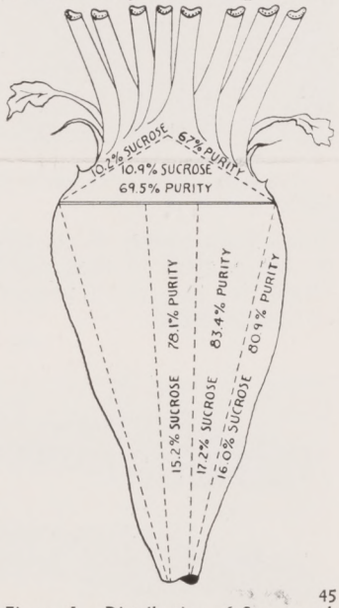
By E. M. HARTMANN
Traveling Chemist, Spreckels Sugar Company

Reflection upon the manner in which the sugar beet grows and produces its sugar is helpful in understanding why the processor desires only the clean fresh root; and suggests ways in which loss of quality and sugar content may be avoided.

Through its rootlets extending into the soil, the beet draws water and the various fertilizer elements such as nitrogen, phosphorous, potassium, iron, calcium, silicon, copper, boron, and magnesium. These materials are carried to the leaves. Using energy derived from sunlight, the clorophyl, or green coloring matter in the leaves, takes carbon dioxide from the air and causes it to react with the water and the fertilizer elements to form all the products which go to make up the beet plant. Some of these products, including practically all of the sugar, are returned to the root for storage. The leaves retain almost none of the sugar, but some of the other products.

It is therefore apparent that the ratio of sugar to total solids in the leaves is very low; the leaves have a very low purity. By the same token, the root will have a very high ratio of sugar to total solids, or a high purity. The crown of the beet is the transition zone between the root and the leaves, and has some of the characteristics of both. Here we find a considerable concentration of nutrients on their way to the leaves, sugar on its way from the leaves to the root, and non-sugar products similar to those retained in the leaves. The purity of the crown is, therefore, considerably lower than that of the root, and its sugar much more costly for the processor to recover.

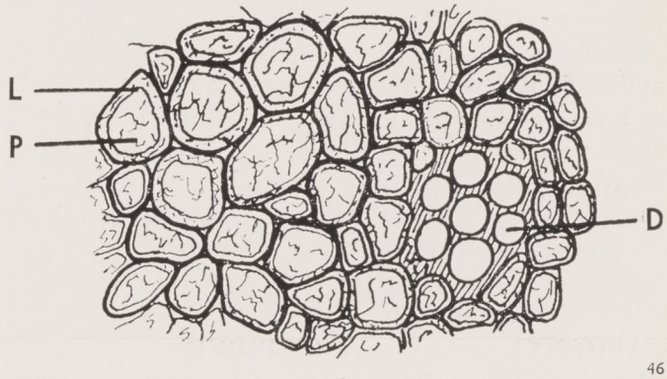
Figure 1 shows the way sugar and purity are distributed in the average beet. Here we see that the sugar content of the crown averages about 10½%, while that of the root is slightly above 16%. The average purity of the crown is about 69%, while that of the root is somewhat over 80%.



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Figure 1.—Distribution of Sugar and Purity in an average beet.

Figure 1 also shows that the sugar content and the purity are lower in the core and nearer the skin of the root than they are in the portion betwen these sections. The reason for this becomes apparent when a horizontal cross-section of the root is examined. It will be observed that the core of the beet is dark and woody. Around this core are rings of white, crisp substance alternating with dark, woody rings similar to the core. If a section containing both the light and dark portions is examined microscopically, a view is obtained such as is illustrated in Figure 2. The white rings are seen



46

Figure 2.—Micro-section (horizontal plane) of a beet root.

to be composed of small, egg shaped cells, consisting of paper-like membrane, a protoplasmic lining (L) and threads of protoplasm (P) immersed in a liquid solution. The sugar is stored in the solution contained in these cells; therefore, the white portions of the root are high in sugar content and purity. The dark core and rings are observed to contain bundles of fibrous tubes or ducts (D). These are the tubes through which the soil water and nutrients pass on their way to the leaves; therefore, they are of low sugar content and purity. It is at once obvious why the core of the beet is low in sugar and purity; and when one further observes that the dark rings become more frequent toward the skin of the root, it also becomes obvious why this portion is also low in sugar and purity.

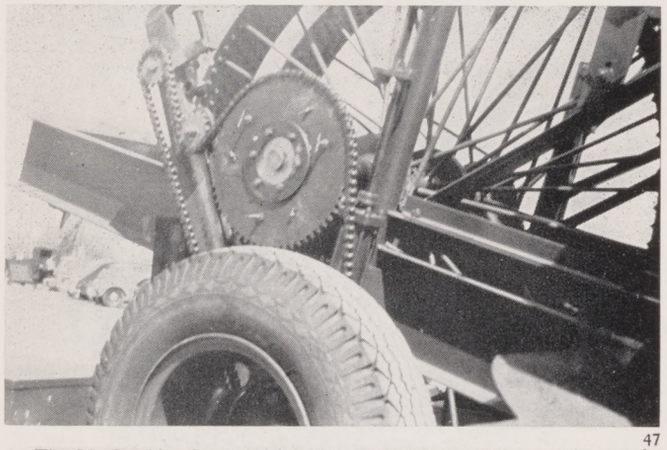
Three ways in which purity can be improved are:

1. PROPER TOPPING. Removal of the undesirable leaves and crowns eliminates the contaminating effect of these materials on the high purity juice extracted from the roots.

2. RAPID DELIVERY AFTER TOPPING. The beet is tenacious to its life. When deprived of its source of solar energy by topping, it turns to its stored sugar and begins to burn this to obtain energy with which to go on living. From the instant of topping, the sugar content and purity of the beet are steadily diminishing.

3. AVOIDANCE OF OVER-FERTILIZATION. Not one of the fertilizer elements is present in the chemical compound sucrose, which is beet or cane sugar. This compound is made up solely from carbon, hydrogen, and oxygen. These are derived from the water in the soil and the carbon dioxide in the air. The fertilizer elements are absolutely necessary for the plants' manufacture of sugar, but many of them enter only temporarily into the complex chemical processes involved, and only in limited amounts. By receiving an excess of fertilizer elements, particularly nitrogen, the plant may be forced to produce unwanted compounds in abnormally large amounts, with consequent sacrifice in both sugar and purity.

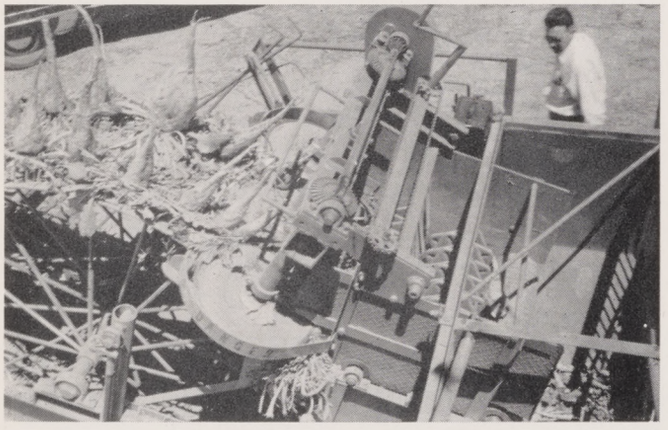
MARBEET ACCESSORIES FOR 1949



47

The Blackwelder Ground Wheel Drive is designed with a ratchet mechanism so that when the harvester is reversed in direction of travel, the spike wheels remain stationary. There is a manual lock-out on the ratchets so that the drive can be disconnected when it is desired to transport the harvester on the highway.

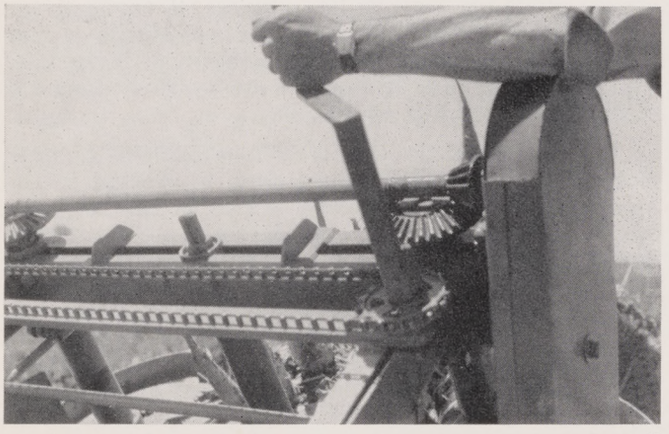
Experience has shown that when the spike wheels are driven by one of the ground wheels, improved topping and beet recovery result.



48

Two years of design work have brought forth this disk topping attachment, available for either one or two-row Marbeet harvesters.

Better topping and much reduced maintenance are claimed for this new device.



49

A feature of the disk topper is the adjustment for cutting depth. A turn of the crank and the topping can be made deeper or shallower. Adjustment can be made while the machine is in motion.

CARE OF MARBEET SPIKES IS IMPORTANT

By J. P. WILLIAMS

District Engineer, Spreckels Sugar Company

After several seasons of operation, Marbeet harvesters become sensitive to plow adjustments, and will occasionally fail to pick up all beets despite the most persistent efforts to find the right plow setting. Chances are that spike trouble is at the root of this evil, and inspection will reveal worn, bent or missing spikes.

Straightening spikes is a routine maintenance operation, but there are right and wrong ways of doing this simple job. DO NOT HAMMER SPIKES. A brittle one may snap off and fly like a pistol bullet. A two foot length of one-half inch pipe is a fairly good tool, but the Spreckels service men at Sacramento devised a special tool which is here illustrated.



½" Pipe Handle, brazed to shank.

14" Section of Beet Elevator Chain Link.

½" Hexagon Nuts, brazed to shank.

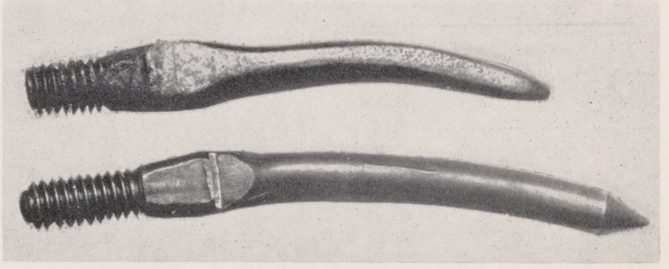
Steel Shield, ⅛" thick, 1½" diam.

50

The spike-straightening tool developed by S. S. Silva of the Spreckels Service Crew at Sacramento.

That little round shield above the two hexagon nuts is not a stop to rest against the spike tip. It is a shield for the user's protection against a flying piece of brittle spike.

(Continued on Page 32)



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The worn spike (upper) has outlived its useful life. It should be replaced by a new one.

TAKING THE BACKACHE OUT OF SYPHON IRRIGATING

By AUSTIN ARMER
Agricultural Engineer, Spreckels Sugar Company

Robert and Kenneth Hausler of Davis do most of their own farming, including irrigation with a set of syphons. Robert remarked that twenty syphons was a full armload, and some device for carrying more of these lightweight tubes would speed the job of irrigating.

The Spreckels Agricultural Engineering Department acted on the suggestion, and made up the syphon carrier here illustrated.

The basic material is one-half inch Electrical Metallic Tubing — the thin-walled steel conduit. The shoulder straps (not shown on the detailed drawing) are army surplus cotton webbing straps.

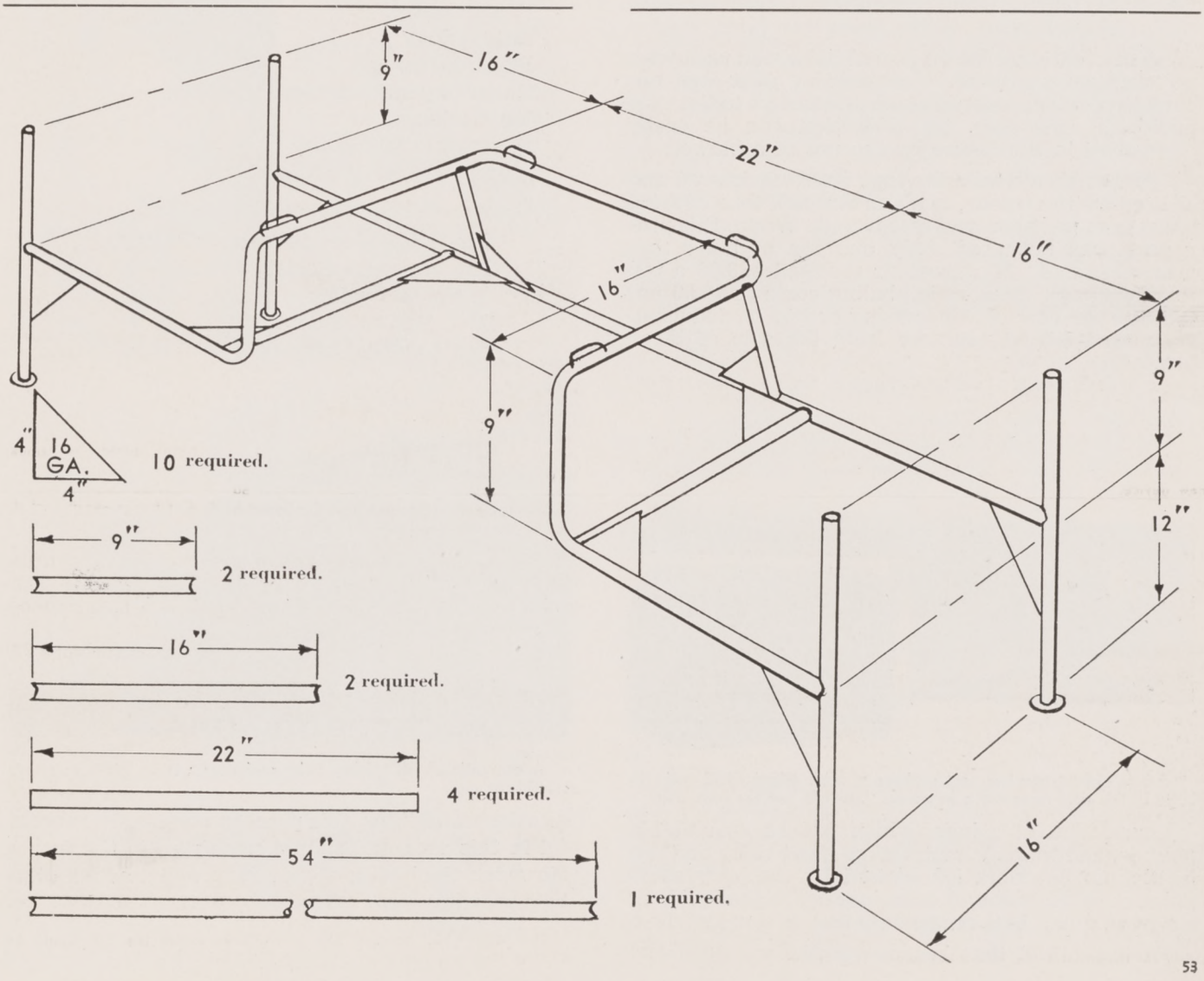
Gas-welding the thin-walled steel tubing is a bit tricky, but if there is an ex-aircraft welder in your neighborhood, the job will be duck soup for him.

With this carrier, a man can distribute a load of forty syphons, and fifty is not an inhumane load.



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Fifty syphons can be carried with ease, using this Spreckels-designed carrier.



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THE SUCCESSFUL BALING OF BEET TOPS

By WALTER BUCKINGHAM

Agricultural Superintendent, Spreckels Sugar Company

The baling of beet tops has been successfully accomplished by Mr. Ernest Carstens, Delano, California, a Spreckels Sugar Company grower. Mr. Carstens used a two-row Marbeet to harvest a 32.9-ton crop. Top growth was average for this area, but below average compared to the normal top growth attained in the Salinas and Sacramento valleys.

To overcome the problem of trucks trampling the tops into the ground, Mr. Carstens used a side delivery rake immediately following the harvester, which cleared a path for the trucks. The use of any other windrowing attachment will suffice, but it must be re-emphasized that the tops must not be trampled by the trucks, as a much lower recovery of tops will occur. After the tops were cured for a period of from ten to fourteen days, they were windrowed for baling, ten beet rows to a windrow. A standard John Deere side delivery rake was used and it worked very well, although wear on the tines was fairly severe.

A conventional International baler was used with no changes whatever. Considerable dust was encountered which caused much discomfort to the wire punchers. However, this objection can be easily eliminated in the future by the use of a blower.

On the area where the tops were windrowed and cleared for the trucks, two and one-half tons of dried baled tops per acre were recovered. Where this procedure was not used, only one ton of baled tops was recovered. Mr. Carstens received $20.00 a ton for these tops, from which baling costs of $4.50 per ton and the cost of windrowing had to be deducted. He netted $47.00 per acre from the sale of these baled tops.



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A bale of beet tops is a neat package of feed. Worth $1.50 each, the bales in this field represent a handsome "dividend" on the beet crop.

Inspection of a bale, which weighs around 156 pounds, shows leafy material of good color and not brittle, no deterioration caused by the very small amount of mold found occasionally on the inside of a crown, and a bale reasonably free of dirt and dust.

It is realized that because of the soil type and weather conditions, this process was highly successful in this area and should remain so in the future. However, the baling of tops may well apply in other beet growing areas where temperatures are high and the soil friable.

(Continued on Page 31)

VALUABLE BOOK NOW AVAILABLE

On alternate years the American Society of Sugar Beet Technologists meets for the purpose of presenting the latest developments in the beet sugar industry. These presentations are carefully compiled and published in the PROCEEDINGS of the AMERICAN SOCIETY OF SUGAR BEET TECHNOLOGISTS.

The 1948 issue is an 804 page book with scientific papers by 129 different authors and co-authors representing industry, U.S.D.A., universities and others interested in the sugar beet industry. It is the latest and most complete publication on current developments in sugar beet agriculture and beet sugar processing. The Table of Contents is as follows:

General Sessions
Seed Germination and Preparation
Improvement and Seed Production
Planting and Thinning
General Agronomy
Irrigation and Soil Fertility
Weed Control
Entomology
Plant Pathology
Chemistry and Factory Operations
Ion Exchange
Harvesting Machinery
Sugar Beet By-Products

Copies can be purchased for $8.00 each. Write to:

The Office of the Secretary-Treasurer
The American Society of Sugar Beet Technologists
P. O. Box #531
Fort Collins, Colorado



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A conventional IHC pickup baler performed well on windrows of sun-cured beet tops.

J. E. COKE WILL DIRECT AGRICULTURAL EXTENSION SERVICE

This will not be news to those who read the daily papers. On May 31, 1949, Mr. C. J. Moroney, President of Spreckels Sugar Company, made the following announcement:

> Mr. J. Earl Coke, Vice-President and Director, will sever his connection with the Spreckels Sugar Company, July first, in order to assume the directorship of the Agricultural Extension Service of the University of California.
>
> Mr. Coke joined the company in 1935 and quickly rose to the position of General Agriculturist. During the past few years he has been in charge of all production activities.
>
> The company deeply regrets the loss of his services, but is justly proud that one of its executives has been called upon to direct such broad and important public service.
>
> (Signed) C. J. MORONEY,
> President



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We of the Agricultural Department congratulate Earl Coke. As Director of Agricultural Extension, he has achieved an intensely worthy ambition — to serve California's agriculture with his administrative talents and rich understanding of agricultural problems. We believe that growers for Spreckels Sugar Company should look to the Agricultural Extension Service for assistance in all branches of their farming activities, secure in the knowledge that their interests and problems are close to the heart of Earl Coke.

BALING OF BEET TOPS

(Continued from Page 30)

There are some very real advantages of baling tops, since the process:

1. Eliminates the guess work as to the amount of beet tops available to cattle as is the case when fed in the field.
2. Eliminates the necessity of fencing.
3. Permits the use of feed lots, resulting in concentration of manure which has a monetary value.
4. Provides additional income for grower.
5. Makes it possible for grower to work land within two to three weeks after harvest.

Keen interest has been shown on the part of growers and cattle feeders. There will be many acres of tops baled in this area during 1949, and it is hoped that interest will spread to other areas.

GUY MANUEL, GENERAL AGRICULTURIST, AT SAN FRANCISCO OFFICE



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Guy D. Manuel, General Agriculturist, now directs the Spreckels Agricultural Department from the San Francisco general office at 2 Pine Street.

Mr. Manuel joined the Company in 1939 — a graduate of the University of California, College of Agriculture. His present broad knowledge of agricultural problems is no accident. He has filled every administrative position in the Spreckels Agricultural Department from Assistant Field Superintendent (1939) to Assistant District Manager (1946).

When appointed as General Agriculturist in October, 1948, he divided his time between Sacramento and Spreckels to insure a close understanding of local problems. With this intimate understanding of District problems, Guy Manuel will now centralize his administrative duties and coordinate the activities of the Agricultural Department with overall Company Management.

The post of Assistant District Manager for the Sacramento District is now held by Harry Venning. Before coming to the Sacramento office, Mr. Venning was Agricultural Superintendent at Woodland.

Field Superintendent for the Los Banos Area is now N. Kenneth Groefsema. He replaces C. Norman Vogt, who is now engaged in farming activities.

S. S. Anderson now holds the title of Assistant Field Superintendent. He has heretofore acted as an assistant on the Plant Breeding Farm at Spreckels.

UNUSED SEED SHOULD BE RETURNED FOR CREDIT

Growers are reminded that full credit is given for seed returned in good condition to the Company warehouses.

We urgently request that all unused seed be returned as soon as possible, and not later than July 31, 1949.

Credit is given not only for unopened bags, but also for partly used bags of seed. All varieties are acceptable, and the full purchase price is credited regardless of seed type or processing method.

Returns of unused seed to date have been prompt, and an early completion of returns will serve the best interests of the grower as well as the Company.

BEET HARVESTING IS A BUSINESS TRANSACTION

By L. A. TINKER

Sacramento Office Manager, Spreckels Sugar Company

What sort of business man would send a $200.00 deposit to the bank in care of an errand boy who didn't know his employer's name? The answer, unfortunately, is that he's the same man who entrusts a loaded beet truck to a driver who does not know his employer's contract number, or even his name.

Fantastic as such a blunder may sound, the Spreckels Sugar Company periodically receives beets from truck drivers who haven't the slightest idea of whose beets they are delivering. Each load of beets is worth between $100.00 and $250.00, and unless the Company accounting office knows definitely whose beets they are, there is a chance that the rightful grower may not be credited with his delivery.

All truck drivers must know the name of the grower and his contract number of each load of beets delivered. It is the grower's responsibility to see that the truck driver has this information. Growers should also check each day to see that the scale tickets for every load taken from his fields show the correct name and contract number. If any errors are discovered, the Spreckels Sugar Company district office should be notified immediately so that corrections can be made.

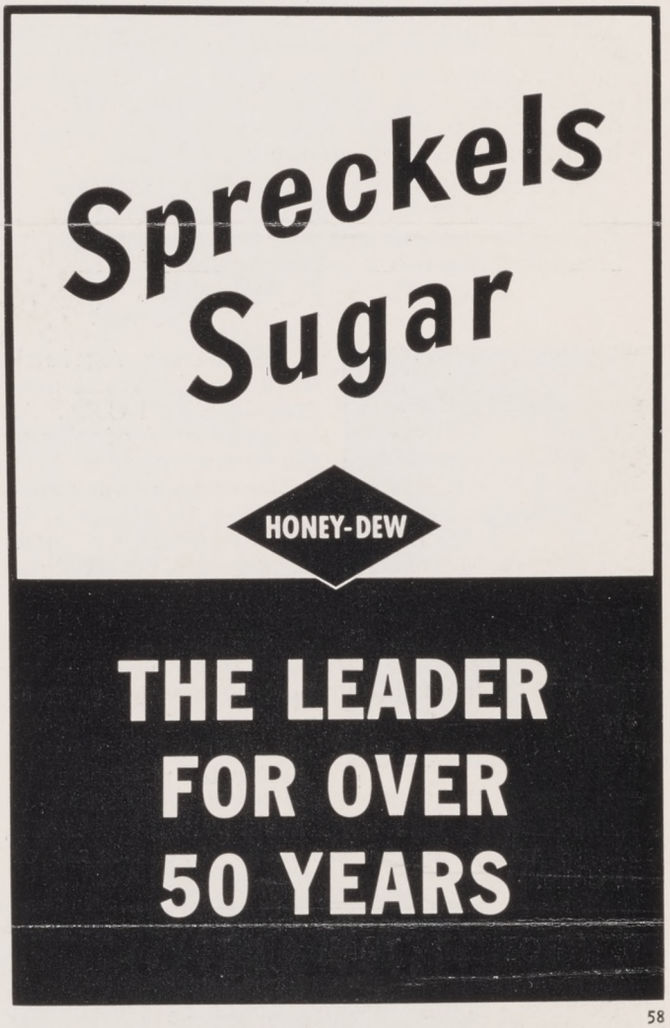
There will be a simplification in the manner of computing "Clean Beets" on our records this year. Previously we have shown on the analysis ticket the percent of tare which had to be multiplied by the "1st Net" and the result deducted from the "1st Net" to arrive at "Clean Beets." This year we will show the "percent of clean beets," which, when multiplied by the "1st Net" will directly result in "Clean Beets."

Scalebeam tickets will retain the same information as in past years with minor changes in arrangement. Particular pains have been taken to insure readable impressions from the type bars. Improvements such as these are designed to bring about maximum accuracy in accounting. Growers can contribute to this accuracy by clearly understanding the Company's accounting procedure, and explaining its significant points to their truck drivers.

NEW SPRECKELS FIELD SIGNS WILL BE LUMINOUS AT NIGHT

When field signs are erected along the highways traversing Spreckels beet growing areas, a brand new design (below) will greet the passing motorist.

Certain signs on the principal highways will be painted in Scotchlite — the paint that glows vividly at night when illuminated by automobile headlights.



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MARBEET SPIKES

(Continued from Page 28)

Badly worn spikes will not pick up beets as well as new ones. When spikes wear, they become tapered, and are easily withdrawn from the beets instead of sticking in tightly. When spikes are worn, as indicated in the cut below, they should be replaced.

Missing spikes mean missed beets. One of the daily routine maintenance operations on every Marbeet harvester should be the replacement of missing or broken spikes. The daily routine check should also include tightening of spike nuts. If these are allowed to remain loose, the square sockets in the pickup wheel rim will wear and the spikes will thereafter not seat properly. When this wear occurs, spikes are very hard to keep tight.

The SPRECKELS SUGAR BEET BULLETIN is published bi-monthly by the Agricultural Department of the Spreckels Sugar Company as a service to its growers.
AUSTIN ARMER, Editor 600 California Fruit Bldg., Sacramento, Calif.

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SPRECKELS SUGAR BEET BULLETIN

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. XIII SEPTEMBER–OCTOBER 1949 No. 5



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FALL PLANNING FOR SPRING PLANTING

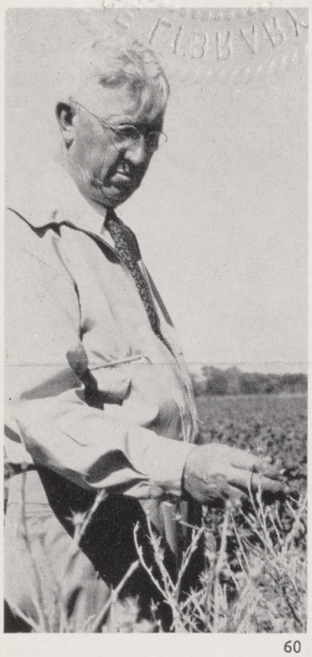
Many of next spring's problems may be anticipated this fall. The well planned 1950 beet program will include:

FALL PLOWING OR CHISELLING
FALL LAND LEVELLING
FALL LISTING OF BEDS

The timely performance of these operations is stressed in this issue.

FALL PLANNING FOR SPRING PLANTING

By W. W. ROBBINS
Head, Botany Division, University of California



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We are in the midst of the sugar beet harvest season. Now is the time to check up on errors, and prepare all the alibis for low yields, if any. Soon we will hear growers starting sentences with something like this: "What I should have done," etc., or "IF I had done," etc. If production is not up to expectations, let's not push too much blame onto the Weather Man. He suffers enough in this respect, and often is quite innocent.

Whatever the mistakes of the past seasons may have been, now we can start to plan for another beet crop. It is not too early to give the matter some serious thought. Every operation from seed bed preparation to harvest should be planned as soon as possible. If you intend to raise beets in 1950, what acreage will go into the crop? When will you plow? Will you plant flat or on beds? When will you seed? What variety of seed, what rate of seeding, how deep will you seed? Do you anticipate harvesting by hand or machine? Do you plan to control early weeds by pre-emergence spraying What fertilizers will you apply, and when? These and many other questions will need be given consideration, and it is better to make decisions now than later.

If it is your decision that you have a suitable piece of ground for sugar beets, that in your system of rotation there is advantage in having a row crop such as beets, and that you need tops for stock feed, go ahead and grow beets. Don't be deterred by the probable outcome of the 1950 elections, or the reorganization of our National Government, or the price of tomatoes in Portugal.

In the growing of any crop, but especially sugar beets, timeliness is all-important, and may be critical. It is not uncommon to see neighbors with adjoining fields of beets, one of which yields 25 tons per acre, the other 12 to 15 tons. The difference is often due to timely operations, and nothing else. Outside of College Professors the worst procrastinators in the world are farmers.

In spite of these disparaging remarks, we must recognize the fact that average sugar beet yields in California over the years have had a general trend upward. Beet growers are gradually becoming better beet growers. As a rule, they are taking advantage of all the modern improvements and methods that affect the raising of the crop. They are shooting for 20-ton and 25-ton yields. And getting them. Even 30-ton and 35-ton yields cause less comment than formerly.

In most sections of California, fall plowing is strongly recommended, particularly with heavy soils. Fall-plowed land retains the winter rains and permits seed-bed preparation for early planting. And it is very important that fall plowing be done when the soil is dry. Do not be disturbed by the clods; they will melt away with the winter rains. But if plowing is done when the soil is wet, the first dry wind will turn the clods into hard bricks, and there may be little or no further rain to melt them away.

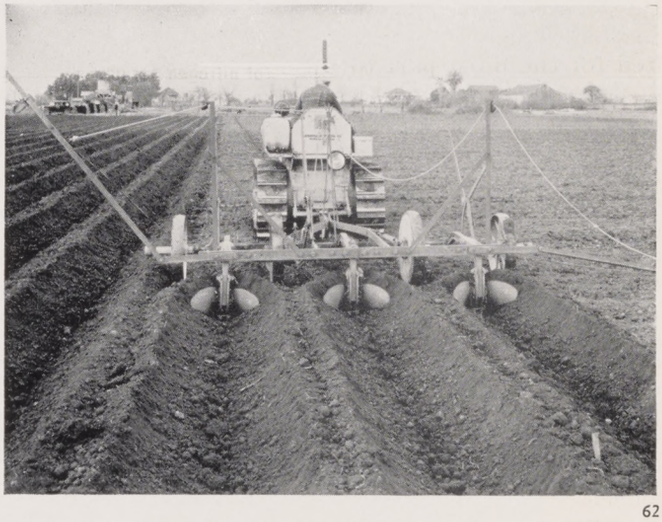


61

This is the penalty paid for plowing wet soil. These boulder-like clods were baked to brick hardness by the spring north winds. There was almost no more spring rain to melt down the clods, so that a seed bed was made only by repeated disking and harrowing — and it was far from a good seed bed.

It is proper here to put in a plug for ridge or bed planting of sugar beets. The acreage devoted to this type of culture has increased during the last few years, and the results have been almost wholly

(Continued on Page 40)



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This is the right way to do a job of fall listing. The ground has been chiselled and harrowed, and the cloddy, loose ridges will be compacted by the coming winter rains. Weather permitting, the beds can be formed in late winter, weeds allowed to sprout, and crop seeds planted in time for pre-emergence spraying of weeds.

FERTILIZING SUGAR BEETS WHERE AND WHEN

By WAYNE F. WEEKS
Extension Specialist in Sugar Beets



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Recent articles in the Spreckels Bulletin (Vol. XIII, No. 1, and No. 3, 1949) have discussed some of the factors which influence a sugar beet fertilization program. There are a number of important things to be considered in developing sound fertilizer practices on any farm.

These include kinds and amounts of elements needed, when to apply them and how to apply them.

KINDS AND AMOUNTS OF ELEMENTS NEEDED

Perhaps the most important item is the kind of fertilizer needed — nitrogen and/or phosphate. Growth and yield responses to nitrogen are the most common on California soils devoted to sugar beets. The amount of response is usually related to the amount of natural fertility remaining in the soil. Some California soils, located mainly in the Salinas and Imperial Valleys, give a definite response to phosphate—particularly where it is applied early in the season.

The cases of paying responses to potash on sugar beets are rare in this state, and are limited for the most part to peat lands in the Delta area.

1. Sugar beets on an "average" field may profitably use from 75 to 150 pounds of nitrogen per acre.
2. The amount of nitrogen used is more important than the form in which it is applied.

The amount of material to apply is another consideration of great importance. Each field presents a different problem. Whereas one field may pay handsome dividends for the application of a large amount of fertilizer, another field may have all the nutrients required for maximum growth without the addition of any fertilizer material. Many sugar beet crops in California can profitably use from 75 to 150 pounds of nitrogen (N) per acre. Where phosphorus or potash is needed 75 to 100 pounds of P_2O_5 or K_2O should satistify most deficiencies.

When developing a fertilizer program, a sugar beet grower must consider the soil and climatic conditions, the season of the year, the time of planting and the method and effectiveness of irrigation. The prospective harvest date should also be taken into account. If one of the important factors is neglected, the highest possibilities of the crop may not be realized.

WHEN TO APPLY THE FERTILIZER

After the choice of fertilizer has been made (See Mr. Lemmon's article in this issue of the Bulletin), and the rate of application has been decided upon, then the question of when to apply it arises.

1. Nitrates may be easily leached from the root zone.
2. Applied phosphates may be fixed in the soil — unavailable for the plants.

Applying the fertilizer at the proper time is very important. Many fertilizer materials require time to be changed into forms which will be available to plants. For this reason when using calcium cyanamide and other slow acting materials, the application should be made well ahead of planting time if stimulation of young beets is desired and in some cases to avoid toxicity. Likewise, with ammonia or ammonium salts, for the most benefit to young beets the material should be applied shortly before the crop is planted. This does not mean that it would be undesirable to apply all such materials later in the season, but it does show that the time lag between application and availability or accessibility to the crop should be considered in attempting to get a certain result.

Since nitrates are not fixed by the soil, they should not be put on the land much earlier than they will be needed by the crop. Fertilizer in the nitrate form is readily available to plants and may be used where a quick response is desired. If high rates of nitrates are applied at one time, some losses may occur through leaching.

For mid-season nitrogen applications, the slower acting materials, particularly at high rates, should be avoided. The crop may not have time to utilize all of it, and a depressed sugar content may result.

Phosphorus fertilizers usually produce their greatest responses on young beets and during the cooler growing periods. Late applications of phosphates frequently do not result in a plant response. Therefore, as a general rule, phosphates, if needed, should be applied early. Since this material may be fixed in the soil and thus be made unavailable for use by plants, it should not be applied much earlier than it will be needed. Usually phosphate applied in the form of single or treble superphosphate or as ammonium phosphate is most satisfactory.

In deciding when to fertilize, a grower should try to anticipate the needs of his crop before they arise and apply the fertilizer in time to provide an available supply of the elements needed before a deficiency develops. Using more than one form of nitrogen may be desirable for best results in some cases. Split applications may be more satisfactory and may avoid losses where high rates of nitrogen are used. Late applications are not recommended because they may delay maturity.

(Continued on Page 38)

THE LEGAL STATUS OF FERTILIZING MATERIALS

By ALLEN B. LEMMON
Chief, Bureau of Chemistry
California State Department of Agriculture



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The Bureau of Chemistry of the California State Department of Agriculture administers portions of the Agricultural Code pertaining to the labeling and sale of pest control materials and fertilizing materials. It is a law-enforcement agency and does not conduct investigations nor provide recomendations with regard to the most effective use of these chemicals. Such investigative and advisory services are provided by the Agricultural Extension Service of the University of California.

The law defines five classes of fertilizing materials. These are commercial fertilizers, agricultural minerals, auxiliary plant chemicals, manures, and soil amendments. The requirements with regard to labeling and sale differ in some respects for each class. A firm must secure registration before it can make sales of a commercial fertilizer. It must register any brand under which it intends to sell its products, and must register the brand name and the composition of any brand name product it intends to sell. The name and the guarantee of each different agricultural mineral and each different auxiliary plant chemical must be registered. The law provides specific labeling requirements for these three classes. Manures and soil amendments are not required to be registered nor labeled. The law prohibits misrepresentation in connection with the sale of any fertilizing material.

COMMERCIAL FERTILIZERS

Commercial fertilizers are materials or mixtures of materials that contain 5% or more of nitrogen, available phosphoric acid, or water-soluble potash, either singly or collectively. These are considered the major plant foods and the value of a particular fertilizing material is usually judged on the basis of the percentage of these constituents. The law requires each bag or lot of commercial fertilizer to carry a statement of the name and percentage of each constituent of agricultural value claimed to be in the material. If the material contains nitrogen, the percentage of each form should be separately shown.

It is a simple matter to determine the amount of nitrogen, available phosphoric acid or water-soluble potash in a 100-lb. sack of a particular mixture as the law requires that the percentage by weight be stated and this permits one to calculate the pounds of the constituents in a sack. The problem is a little more difficult with regard to liquid fertilizers as they are often sold in terms of gallons instead of by weight. Most liquid mixed fertilizers weigh about 10 pounds per gallon, so 10 gallons of a liquid fertilizer guaranteed 10-10-5 contains approximately the same amount of major plant foods as 100 pounds of dry mixed fertilizer guaranteed 10-10-5.

TRACE ELEMENTS

The proper place of micronutrients in fertilizers is still a problem. There is no question that fertilizers for some crops in some areas need more than the three customary plant foods, but the requirements seem too complex to permit generalizations in compositions or recommendations. In some areas, there is a genuine shortage of certain important elements; in others the difficulty is not so much shortage of a certain element as it is one of fixation in the soil. Soils in so-called deficient areas may contain a large amount of the critical element, but it is in a form not available to certain plants. On the other hand, an element lacking in one area may be present in detrimental excess in another area. It seems questionable that micronutrients should be added to all fertilizers indiscriminately, and in many areas the problem will probably have to be handled on a prescription basis.

The main administrative problem in this connection is the minimum amount of a constituent for which claim may be made. Sales talk of the agricultural value of micronutrients present as impurities in amounts determinable only by spectroscopic study seems clearly misrepresentation. If claim is made for presence of an element in a mixed fertilizer, the element should be present in a reasonable amount and the specific amount should be guaranteed. The problem is to establish what constitutes a reasonable amount. This bureau has been accepting claims for micronutrients if they are guaranteed at least 0.5% in water-soluble form expressed as metallic. An exception is made in the case of boron, for which a smaller amount may be guaranteed. A smaller amount of any component would be acceptable if it were demonstrated to be of value.

AGRICULTURAL MINERALS

Agricultural minerals are defined by law as mineral substances or mixtures of mineral substances, or mixtures of mineral and organic substances, containing less than 5% of nitrogen, available phosphoric acid and water-soluble potash. In this class there are included lime, sulphur, lime-sulphur solution, sulphuric acid, and sulphur dioxide, but gypsum is the one sold in largest tonnages.

Most of the agricultural gypsum sold in California is used in San Joaquin Valley within trucking distance of local deposits, although a portion of the tonnage is used in other parts of the State. It is applied to improve soil texture, increase permeability to water, alleviate severe clod and crust formation, render the soil easier to work, and to aid in the reclamation of alkali soils. Gypsum reacts with sodium carbonate, commonly called black alkali, to form sodium sulphate, commonly called white alkali, and calcium carbonate, which is the same as lime-

stone. Sodium sulphate is much less injurious to plant life than is sodium carbonate, so the conversion is of distinct advantage. Soils alkaline with sodium carbonate are sticky when wet, and set to a hard cake when dry. Addition of gypsum aids in flocculating the mass and tends to make the soil loose and friable.

Gypsum is applied to soils where many of the diversified crops are grown in San Joaquin Valley, and particularly on those for potatoes in Kern County where most growers use gypsum primarily to improve penetration by water during irrigation. Gypsum is also used on sulphur-deficient soils to supply this element to alfalfa and leguminous cover crops. The use of gypsum in California is correlated with soil type rather than with any specific crops, but the other crops most commonly grown in the area of greatest use include citrus or deciduous orchards, vineyards, cotton, and vegetables.

Gypsum is not suitable for reducing acidity of soils. However, soils in California are commonly somewhat alkaline, and acid soils are a problem in only a few places in the State. Gypsum may be largely wasted if applied to acid soils or to light loam or sandy soils, unless an actual deficiency of soil-sulphur or soil-calcium is involved.

From time to time some interest is shown in marketing waste materials from mines, or natural deposits of materials claimed to be beneficial to the soil. These materials are usually agricultural minerals because they do not contain any significant amount of the three major plant foods and they must be registered and labeled the same as any other agricultural mineral. In some cases the materials do not appear to be of sufficient agricultural value to warrant the cost of transportation. However, the law requires the percentage of every constituent of agricultural value to be stated on the bag, and it is left to the judgment of the purchaser to decide whether the stated analysis justifies the price.

Although accurate figures are available showing the total tonnage of each type of commercial fertilizer sold in California, there are no data with regard to the areas of the State in which they are used nor the crops on which they are applied. Figures for the war-year 1943, obtained by tabulation of the special order forms which growers submitted to manufacturers, showed that approximately 3.6% of the total tonnage of commercial fertilizers sold that year were ordered for use on sugar beets. If this same proportion was used last year, it may be estimated that 20,000 tons of commercial fertilizers were applied on sugar beets in California in 1948. This represents an expenditure of $1,500,000.

Official samples are drawn throughout the State from deliveries of the various fertilizing materials to check conformity with the guaranteed analysis. A copy of the laboratory report giving the analysis is sent to the registrant and another copy is sent to any dealer or purchaser involved in the particular lot sampled. Whenever a deficiency of economic importance is discovered, the manufacturer generally makes prompt refund to the purchaser ac-

(Continued on Page 38)

WHEN TO EXPECT FALL RAINS

By A. V. PIERSON
U. S. Weather Bureau, Sacramento, California

While the many advantages of fall land preparation are self-evident, the farmer may justifiably hesitate to plan a fall tillage program because of the possibility of rain.

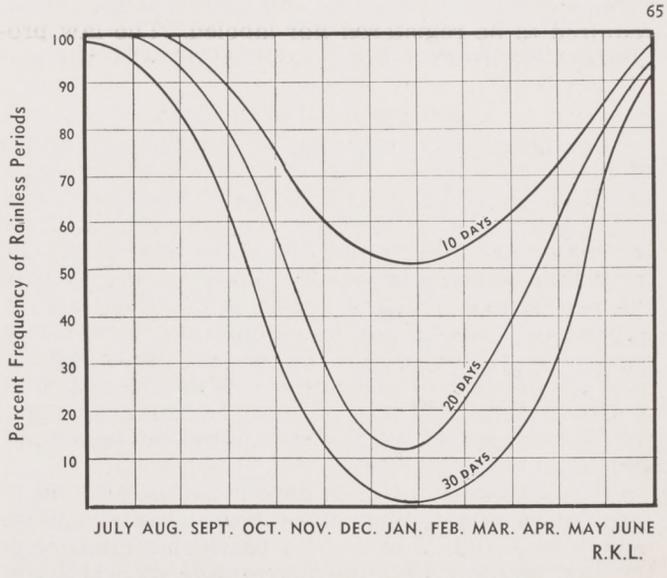
It would be fortunate indeed if the date and amount of rainfall could be predicted at long range. But such prediction is not possible, so the next best answer may be found by analyzing the past records of rainfall. While such an analysis gives only average conditions, and "unusual" dates and amounts of rainfall may always occur, the historical averages are nevertheless of value.

In order to present these historical averages of rainfall and dates, curves have been plotted to show the frequency of 10, 20 and 30 day rainless periods.

Assume that a certain land preparation program will require 30 days to complete. Looking at the line marked "30 days", we see that in January there is only a 2% chance of 30 days or more without rain (as compared to the mid-June chance of 98%). Therefore, a 30 day program must start early in the fall to be reasonably protected against the possibility of rain.

Suppose now that only 10 days of dry weather will suffice to complete the program. Looking at the line marked "10 days", we see that in January there is now a 53% chance that there will be a 10 day dry period.

Thus a 10 day program could start much later in the Fall than could a 30 day program with the same expectancy for consecutive rainless days.



This chart is a guide to the expectancy of dry periods during each month of the year. Curves are plotted for 10, 20 and 30 day dry periods.

FERTILIZING BEETS

(Continued from Page 35)

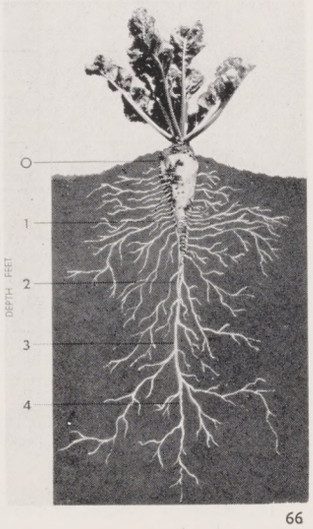
WHERE AND HOW TO PLACE FERTILIZER

The placing of fertilizer in the right location in the root zone is just as important a consideration as the kind and rate of material that is used. In placing fertilizer for most efficient utilization, consideration must be given to the type of material used, size of plants, moisture conditions and other factors.

> To be accessible, fertilizer must be:
> 1. Within reach of the plant roots and
> 2. In moist soil.

Sugar beets are fertilized by broadcasting the material or by banding it in rows. Applications made in the irrigation water are essentially broadcast on the area wetted. Generally speaking, localized placement of fertilizer materials is much preferred to broadcasting. When the fertilizer is drilled into place, its accessibility to the beet plant is usually increased because it is put in the active root zone. When it is drilled in, the fertilizer can be placed below the cultivated layer of soil and thus it is free from disturbance—which increases its accessibility. Deep placement also reduces the chance of it being left high and dry as the surface soil loses moisture. Another advantage with localized placement is that less of the fertilizer is absorbed by the soil—more may be available to the plant, so it may take a smaller quantity to give the same result.

Ammonia and the ammonium compounds are the principal nitrogen sources used on California sugar beets. Where as nitrates move freely in the soil, nitrogen in the ammonia form is quickly fixed and held in the soil near the area where it is placed. Until soil organisms convert the fixed ammonia to nitrate it will not move deeper into the root zone. For this reason, deep placement of ammonia or ammoniacal materials will usually give quicker and more effective results. If moisture and temperature conditions are favorable nitrification of these materials will take place rather rapidly. Subsequent irrigations will move the nitrates deeper into the soil.



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ROOT SYSTEM OF THE BEET PLANT. Fertilizer that has been placed 3 inches deep may not be accessible to the plant because of rapid soil drying at the surface or because the feeder roots near the soil surface are destroyed in cultivation. Applications that have been made 6 inches deep are well into the active root zone, are not likely to be disturbed by cultivation, and are not subject to rapid soil drying. Of the materials applied, only the nitrates are found in any quantity below the 12 inch depth.

The practice of applying fertilizer before planting is increasing and can generally be recommended where materials not subject to leaching are used. The time required and cost of applying fertilizer is less where it is done this way. In many cases the early stimulation of growth due to the fertilizer may be beneficial and may shorten the time until thinning.

Frequently young beets have all the essential nutrients and will not respond to early applications of additional fertilizer. Under such conditions the common practice of drilling in fertilizer at thinning time may best be used.

Soluble substances in the soil move mainly downward since they are carried in the soil water. Lateral movement is limited because water does not move laterally to any degree under most soil conditions. Therefore, if a response is to be expected in young beets, applications of fertilizer should be placed reasonably close to the tap root. With older beets, where the rootlets have extended well out into the soil, deep placement between the rows is satisfactory; such placement is much better than a shallow application made close to the tap root.

Excellent results have been secured by applying nitrogen and phosphoric acid in irrigation water. To use this method of fertilizing, soluble materials must be employed. The distribution of the material can be no better than the distribution of the irrigation water over the field. Even though this method does not give very localized placement of the fertilizer, it is often effective where additional irrigating is done. The nutrients in liquid fertilizers are usually more expensive than dry materials, but the ease and low cost of application makes the method worth considering where fertilizing is to be done in established stands of beets.

> Where water is unevenly applied, fertilizer in the water will be unevenly distributed.

The intelligent use of fertilizers has contributed much to California's increased yields of sugar beets. Application of the proper materials, principally nitrogen and sometimes phosphorus, at the proper rates are two of the important considerations in a sound fertilizer program. Improvements in the placement of the materials in the soil and in timing their application for the best advantage can increase the efficiency of such a program—thus increasing the returns from investments in fertilizer materials.

LEGAL STATUS

(Continued from Page 37)

cording to the shortage in the particular lot sampled. At the end of the year the analyses are tabulated and issued as a special publication, copies of which are available upon request. The 1948 special publication is No. 231 and it provides the analyses of over 2,000 official samples of commercial fertilizers and 335 samples of agricultural minerals. Growers find the summary of value in comparing the records of different manufacturers.

RECENT DEVELOPMENTS IN TILLAGE TOOLS

By AUSTIN ARMER
Agricultural Engineer, Spreckels Sugar Company

Tilling of the soil is as old as Agriculture itself. But there always seems to be room for improvement in tillage methods and tools. In preparing California soils for field crop planting, certain trends have been evident in recent years. Some of these trends are:

1. Subsoiling or deep chiselling.
2. Avoidance of plowsole.
3. Maintaining humus close to the surface.
4. Simplification and cost reduction of tillage operations.

Two California implement manufacturers have developed tillage tools based on these four trends. Both designs are based upon tractor-mounted rear tool bars with hydraulic lift and positive depth control. Both designs provide for substantially the same sequence of tillage operations—chiselling followed by preliminary seed bed preparation.

The Davis Machine Works, Davis, California, builds a rugged tool bar for rear mounting on tracklaying tractors. Wide enough to mount five lister bottoms, this tool bar permits the tractor to operate at full power output while covering maximum daily acreage. Since the tools are much closer to the tractor than is the case with conventional trailed tool carriers, turning distance is reduced, and steering improved. Unusually straight ridges can be formed when the attachment is used for listing (See cover photograph).

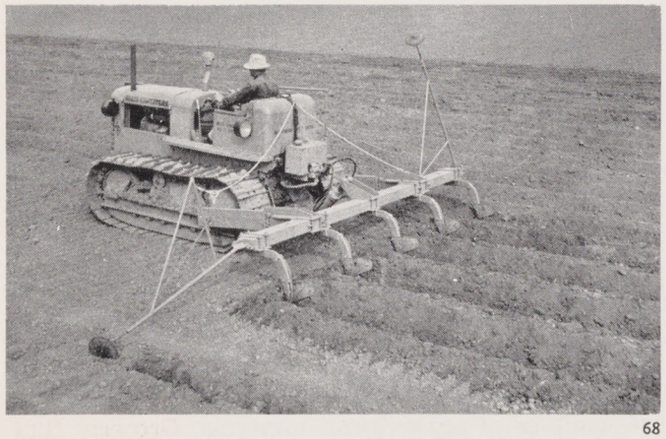
The Marvin Landplane Company at Woodland, California, has interpreted these same tillage trends, but has designed a line of tools for use on wheel type tractors. Deep tillage is accomplished with two subsoiler standards, while the surface soil is broken up by their "Boga" shovels. These shovels do not turn under the surface soil, but stir it and pulverize it. They effectively mix humus into the soil surface, but do not bury it as is the case with moldboard plows or disc harrows.

FOR THE BIG FELLOW



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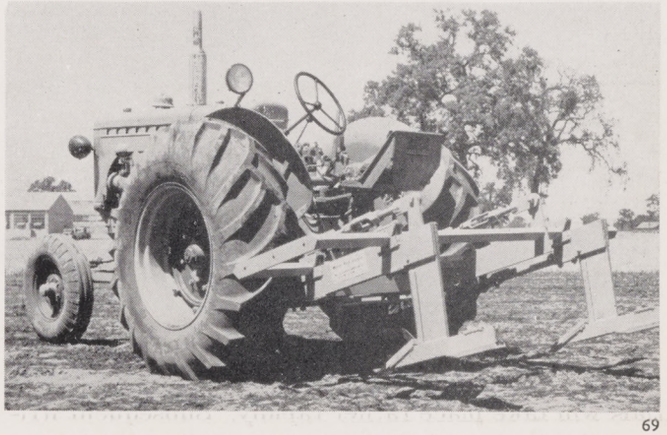
Davis Machine Works builds this hydraulic-lift tool bar for tracklaying tractors. A set of chisels is shown mounted on the tool bar.



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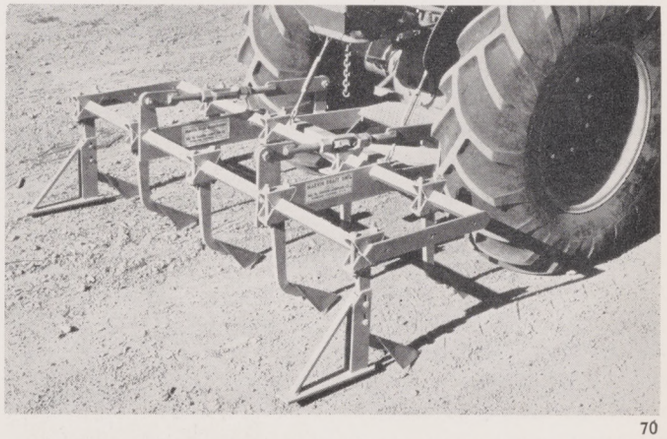
Here the same tool bar has been provided with five lister bottoms. Guess rows are eliminated when a four-bed (eight row) planter is used.

FOR THE LITTLE FELLOW



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The Marvin Land Plane Company builds this tool-carrier for wheel type tractors. The two subsoilers serve for deep tillage.



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Several attachments are available for the Marvin tool carrier. These "Boga" shovels are useful for pulverizing and mulching surface soil.

SPRECKELS INTRODUCES NEW SUGAR PACKAGE

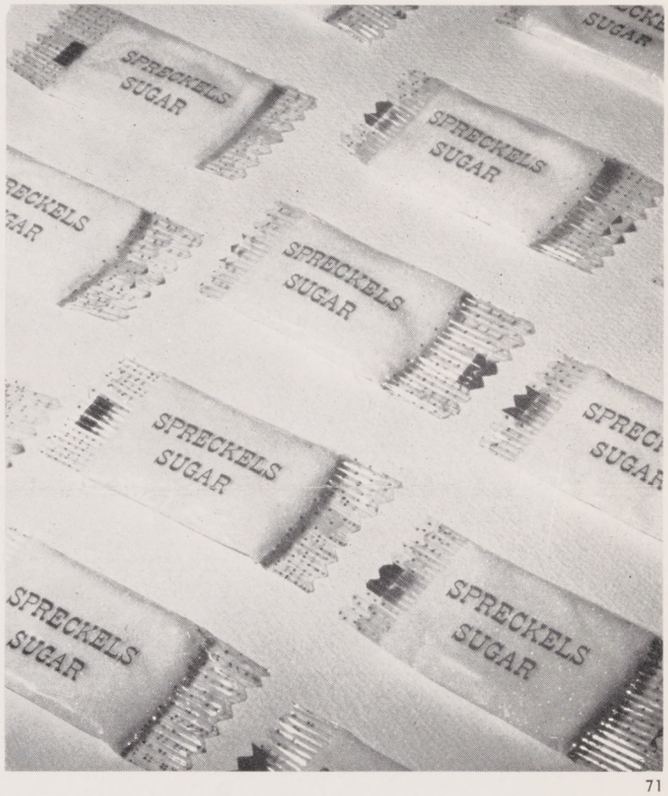
By WILLIAM H. OTTEY
Sales Manager, Spreckels Sugar Company

A cellophane packed individual serving of fine granulated sugar is now being used by hotels, restaurants, drive-ins and hospitals on the West Coast. This is an all-purpose package because granulated sugar in individual packets can be used in iced drinks, on fruits and cereals, and other "sprinkle" purposes, as well as in hot tea and coffee.

Each serving contains ¼-ounce of sugar which is equivalent to a heaping teaspoonful. The cellophane packet is 1⅜ inches wide by 3 inches long (including the sealed ends). The words, "Spreckels Sugar" are printed in red on the two faces of the packet allowing ample space for the sparkling sugar to show through the cellophane. The heat-sealed ends have a red and blue polka-dot design. "Pinked" edges make the packet very easy to open.

The Spreckels Individual Servings are packed in 25-lb. containers. Each container holds approximately 1600 packets. This new sugar package can be purchased from West Coast jobbers and suppliers.

Restaurateurs and others welcome this individual serving of Spreckels granulated sugar because it is sanitary, easy to handle, labor-saving and has a definite appeal to customers.



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These are the new ¼ ounce individual cellophane packets of Spreckels Sugar. The heat-sealed ends are "pinked" for easy opening.

FALL PLANTING

(Continued from Page 34)

satisfactory. Any grower should give bed planting a fair trial, in comparison with flat planting. Some of the advantages of ridge or bed planting are as follows:

(1) It permits an irrigation which in many cases may be necessary to bring about seed germination. (2) It distributes water in deep furrows so that none stands about the crowns of beets. (3) It eliminates the danger of covering young beets in furrowing out. (4) It is especially adapted to beet culture where seeding done early is followed by wet and cold weather. (5) Seeds on ridges germinate earlier, which permits early thinning, cultivation, and irrigation. (6) The young plants receive good aeration and drainage. (7) There is less tendency to crust formation. (8) In lifting two rows of beets 14 inches apart, there is efficient performance of the lifting plow or harvester. (9) It offers an opportunity for pre-emergence weed spraying.

In most California sugar-beet areas, it is advisable to throw up the inverted V-shaped ridges with a lister in the fall, and leave them rough through the succeeding rainy months. Thus the soil in the beds has a chance to settle. Later, after the ridges are shaped, an opportunity may be offered to practice pre-emergence spraying to control weeds. In this event, shaped beds may be allowed to develop a growth of weed seedlings before beets are seeded. Following seeding of beets, spray the beds to destroy weeds, allowing the beet seedlings to emerge in a weed-free soil. For this purpose, use diesel oil, fortified with one of the dinitro-phenols. If seeding of beets is done promptly after beds are planted, the beet seedlings and weed seedlings may emerge simultaneously and there may be no opportunity to apply a pre-emergence spray. Thus far, no satisfactory selective herbicide is available for post-emergence treatment which will destroy weeds but not harm beet plants.

There are few crops that respond so strikingly to proper and timely treatments as do sugar beets. They will reward a well planned growing program with high yields and a healthy profit.

The SPRECKELS SUGAR BEET BULLETIN is published bi-monthly by the Agricultural Department of the Spreckels Sugar Company as a service to its growers.

Editor
AUSTIN ARMER
600 California Fruit Bldg.
Sacramento, Calif.

SPRECKELS SUGAR BEET BULLETIN

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. XIII NOVEMBER–DECEMBER 1949 No. 6

NOV 15



William Thomas Larkins Photo, Courtesy Jack Wilson Chemical Company 72

FARM IMPLEMENT - 1950 MODEL

Long indispensable to the cotton, rice and tomato grower, the airplane now has much to offer the beet grower.

PRE-PLANTING SPRAYING
PRE-EMERGENCE SPRAYING
INSECT CONTROL

can all be done at low cost from the air. Case histories are reported on page 42.

HONEY-DEW

PRE-EMERGENCE SPRAYING BY AIRPLANE

By AUSTIN ARMER

Agricultural Engineer, Spreckels Sugar Company

Pre-emergence weed control can be successful only if the spraying is done at exactly the right time. "Exactly the Right Time" may be when the seed bed is too wet to plant, but is sprouting a lush crop of weeds. It may be when the field has been planted and irrigated up, but a sudden warm spell has germinated weeds before emergence of the beets.

This need for immediate weed killing on wet fields makes the use of ground rigs impossible. The airplane then offers a perfect solution to the problem.

Several growers for Spreckels Sugar Company in the Davis-Dixon area made effective use of airplane spraying early in 1949. Everett Kunze had fields with beds formed and ready to plant as soon as they became dry enough. But weeds of all kinds were beginning to emerge, and promised to grow to uncontrollable size before the ground was dry enough to support a tractor.

Airplane spraying at once suggested itself, and a few 'phone calls quickly established the proper spray formula, rate of application, and cost per acre. The formula was diesel fuel fortified with Synox (dinitro-amylphenol). The rate of application was 20 gallons of oil plus one quart of Synox per acre. The cost was $6.20 per acre for material plus application.

When the ground had dried sufficiently, these fields were planted. Weed kill had not been entirely complete, and more weeds emerged with the beets. But from the time of emergence. normal cultivating and thinning procedure provided adequate weed control.

Following is the comparison of costs per acre:

AIRPLANE WEED CONTROL		ALTERNATIVE PROCEDURE	
Per acre cost of Material and Application	$6.20	Disking in Weeds	$3.00
		Listing new Beds	2.00
		Bed forming	1.50
TOTAL	$6.20	TOTAL	$6.50

Haussler Brothers successfully solved another type of spring weed problem with airplane spraying. Their fields had been planted on beds and irrigated for emergence. Unseasonal warm weather caused an immediate sprouting of dormant morning glory roots. The fields became carpeted with a vigorous growth of morning glory, while the beet seeds were just sprouting and not due to emerge for two or three days.

The recently irrigated furrows would not support ground equipment, so here again the airplane suggested itself. In this case immediate action was necessary. A spray material had to be chosen which would produce a minimum residual toxicity on the ground. The choice was General Weed Exterminator, one of the "Hot Oil" types of contact herbicide. This was sprayed by a boom-equipped airplane at the rate of 20 gallons per acre. (18 gallons of diesel fuel plus 2 gallons of Exterminator).

Emergence of beet seedlings started two days after spraying. The morning glory foliage was completely burned, although the plants in many cases survived. These surviving plants were controlled by normal cultivating and thinning operations. Hoeing costs would probably have been reduced if the spraying had been done two or three days earlier.

The cost saving per acre in these operations is evident from the following comparison:

AIRPLANE WEED CONTROL		ALTERNATIVE PROCEDURE	
Per acre cost of Material and Application	$6.24	Disking in Weeds	$3.00
		Listing new Beds	2.00
		Bed forming	1.50
		Planting	4.00
		Irrigating Up	5.00
TOTAL	$6.24	TOTAL	$15.50

The cash saving was significant, but the important advantage was in overcoming the need for replanting, with its many intangible costs and hazards.

The growers who have pioneered in pre-emergence spraying by airplane richly deserve the rewards of their enterprise. Other growers may well profit by their example when a critical appraisal of local conditions points to an airplane spraying program.



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MORNING GLORY covered the Haussler field as a result of irrigating the field to germinate the dry-planted beet seed.



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UNDER THE WIRE and over the flagman. 20 gallons of "Hot Oil" were sprayed on each acre of weed-covered field.

PLANT SUGAR BEETS EARLY

By RALPH S. LAMBDIN

Assistant District Manager, Spreckels Sugar Company

In California early planting of sugar beets has been a common practice among a large number of growers for many years. In central California early plantings start in December and end about March 15.

We believe that the grower who plants as early as permissable under his localized condition is most likely to produce the maximum yield of sugar per acre. In order to secure some data to substantiate this idea we have checked the planting dates on the contracts yielding the most sugar per acre for the past five years in seven representative local areas of the Factory One District.

The following tabulation lists these areas and planting dates:

AREA	1944	1945	1946	1947	1948	Average
Watsonville	Mar. 11	Mar. 10	Mar. 23	Feb. 22	Feb. 28	Mar. 7
Salinas	Jan. 22	Apr. 14	Feb. 2	Jan. 18	Jan. 17	Feb. 8
San Juan	Jan. 22	Jan. 27	Mar. 1	Feb. 1	Feb. 21	Feb. 7
Hollister	Jan. 22	Feb. 17	Jan. 22	Jan. 25	Jan. 15	Jan. 26
Gilroy	Mar. 25	Mar. 17	Jan. 26	Mar. 1	Jan. 31	Feb. 24
Gonzales	Feb. 19	Jan. 13	Dec. 22	Feb. 8	Jan. 29	Jan. 24
King City	Jan. 29	Jan. 25	Feb. 2	Jan. 15	Jan. 31	Jan. 26
AVERAGE (All Areas, 1944-1948)						Feb. 8

It is apparent that early plantings vary to some degree. For example, the early plantings in the Gonzales area are made prior to February 15, while in the Watsonville district the early plantings are made from February 15 to March 15. This is due to a heavier rainfall in this area.

The King City area is light in rainfall and might be considered for extremely early planting, but other factors are involved which make this impractical, the main one being the over-wintering Euttetix which are carriers of Curly Top or Blight. In this area it generally is advisable to wait until plantings can be made with seed that is extremely resistant to Curly Top. This high resistant seed cannot be planted before January 15 because of its bolting tendency.

In summary we can definitely state that the majority of high yielding crops are planted during the period from January 1 to March 1.



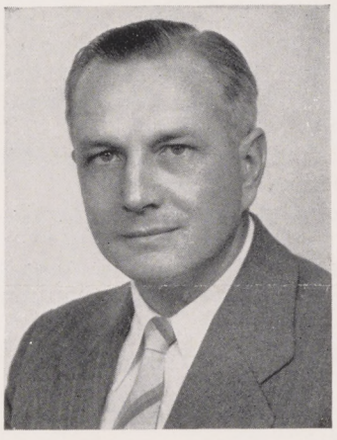
75

A CLEAN BEET FIELD emerged from the spray-killed weeds. Only normal cultivation and thinning followed emergence of beet seedlings.

DISEASE FACTORS THAT DETERMINE A SUGAR BEET ROTATION

By L. D. LEACH

Plant Pathologist, University of California, Davis



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Carefully selected rotations are often the most effective and the least expensive method of reducing losses from certain types of plant diseases and pests. The benefits of crop rotations in relation to fertility, soil texture and weed control have been well established. (See "Rotation Influences Beet Yields" by Prof. B. A. Madsen, Spreckels Sugar Beet Bulletin, September - October, 1944). Therefore I shall limit this discussion to the part played by diseases and nematodes.

Whenever a disease occurs in destructive amounts in a crop, the question is asked: Will the same disease recur next year if I again plant the same crop? It is obvious that not all types of diseases can be influenced by rotation. Curly top, a virus disease, is carried many miles into sugar beet fields by beet leaf-hoppers. This disease may be severe in a field one year and entirely absent the next year depending upon the flights of leaf-hoppers, and rotations, therefore, have no direct effect on its severity.

Downy mildew of beets occurs in the coastal area of California whenever weather conditions are favorable. Since most of the infection comes from wind blown spores, rotation has little or no effect upon the severity of downy mildew as long as inoculum is present within the area.

In general we may say that disease outbreaks started from wind blown spores, infected seed, or virus diseases carried by insects are not usually influenced by rotations. The diseases affected by rotation are those caused by parasites that live in the soil from year to year.

Continuous cropping offers the maximum opportunity for the increase of any soil borne pest or disease. In the case of sugar beets, the large tonnage of leaves and roots and their high energy content is particularly favorable for the multiplication of certain types of organisms.

The purpose of rotation for disease control are: **first,** to avoid planting crops that will prove unprofitable; and **second,** to give the organisms a chance to die out or at least to be reduced in number.

The length of a rotation needed to reduce a fungus or nematode population to a safe point will depend upon two characteristics: **first,** the host range or specificity of the organism; **second,** its ability to survive and multiply in the absence of living host plants.

(Continued on Page 44)

BALING AND FEEDING SUGAR BEET TOPS—A PROGRESS REPORT

By JOHN LEAR

Livestock Specialist, Spreckels Sugar Company

Of the many systems of sugar beet top recovery which have been proposed, baling the windrow-cured tops appears to be the system most likely to succeed in California. Baling was accomplished on over 600 acres of California beet fields in 1949, and accurate cost studies are in progress.

There is no problem in making beet top bales if proper attention is given to certain details.

The most successful procedure includes the following steps:

1. Harvesting with a Marbeet machine equipped with windrowing attachment to form 4-row windrows.
2. Harrowing and rolling the harvested ground directly behind the harvester.
3. Raking two 4-row windrows into one 8-row windrow.
4. Curing 4 to 8 days, depending on temperature and winds).
5. Re-raking the windrow to shake dirt out of the cured tops.
6. Baling with a standard 3 wire pickup baler.

In comparing sun cured baled beet tops with other feeds some interesting facts reveal themselves. A beet top sample taken from the center of one of the above described bales was analyzed and compared with other feeds. Here is the comparison:

	Dry Matter	Total Digestable Nutrients	Protein
Beet tops	85.0	58	8.54
Alfalfa Hay	90.4	50.3	10.6
Oat Hay	88.2	48.1	3.3
Barley	90.0	78	7.8

At the present time, with alfalfa hay selling for around $27.00 per ton, baled beet tops based on the above analysis should be worth nearly what alfalfa is, even though their true value hasn't been appreciated by Pacific slope feeders.

At the present time one grower's cattle are eating a ration consisting of baled beet tops and wild hay. Accurate figures on gains and feed weights are kept to prove how well and cheaply they may be fed.

After the tops are baled for ease of handling and then brought to the feeding area, they are ground up into about ½" lengths. This grinding is essential in that it mixes crown and leaf thoroughly, and animals eat all the mixture. If left whole the cattle will eat the crowns first, and waste a part of the leaves. These ground tops are fed in an open rectangular trough or bunker the same as any concentrate.

A feeding operation where tops were being ground would lend itself to the mixing of other feeds such as barley, molasses and hay to complete a fattening ration.

The cattle have access to all the wild hay they desire, but aren't eating any great amount.

These cattle have a considerable length of time before finishing, so any definite figure on cost or gain can not be tabulated at this time. However, we do know these animals are gaining very well, because of the amount of feed consumed, and the appearance of steers as covering and coat improve from week to week.

At a later date, when more of these baled tops have been fed, we will have more to report on this by-product of sugar beets. Details of baling methods, costs, and actual feeding gains will be published in detail.

DISEASE FACTORS

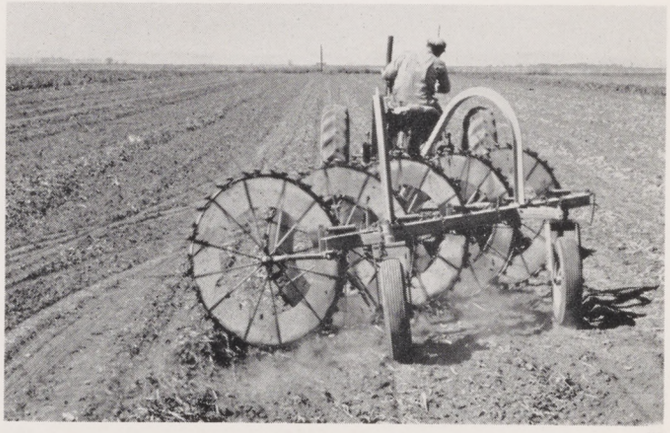
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For example the Southern Sclerotium Rot fungus has a wide host range and attacks many vegetables and field crops. Its activity is limited, however, to seasons of moderate or high temperature and to soils with abundant moisture in the infection zone. For these reasons winter-grown crops such as barley or garden peas usually escape infection and are safe in rotation with sugar beets. But susceptible crops such as beans or carrots tend to maintain or even to increase the amount of the fungus when they are grown in infested land during the summer months. After three or four years of non-susceptible or winter-grown crops the population of the fungus is



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HARVESTING BEETS with a windrower-equipped Marbeet harvester is followed by harrowing and rolling to smooth the ground for windrowing.



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RAKING TOPS into 8-row windrows is done with a Morrill rake. After curing, the windrow is turned over with a reel-type rake to discard dirt.

usually reduced to a low level and one crop of sugar beets can be grown without excessive losses. If a small amount of infection occurs, as is usually the case, another rotation period of 2 to 4 years is necessary before the next crop of sugar beets.

NEMATODE CONTROL

In several beet producing areas of California sugar beet nematode has been increasing and spreading in recent years and is now a major consideration in planning a rotation. An excellent summary of information on both sugar beet nematode and root knot nematode can be found in an article by Dr. Merlin W. Allen entitled "Nematode Pests of Sugar Beets" in Spreckels Sugar Beet Bulletin, May-June, 1944. Dr. Allen emphasized that the host range of sugar beet nematode is limited to the beet family including sugar beets and garden beets and to the cabbage family including cabbage, cauliflower, broccoli, radish, and mustards.

A satisfactory rotation where this pest is involved must exclude these crops for a period of 3 or 4 years to permit the death of nematode eggs which survive within cysts which are the bodies of dead females. Thin stands of alfalfa or cereal crops containing mustard are not as effective as weed-free non-susceptible crops.

An example of the benefits to be gained by satisfactory rotations can be shown in the case of a beet field in the Woodland district. In 1936 a severe infestation of sugar beet nematode occurred and the yield was reduced to less than 10 tons per acre. The following winter alfalfa was planted and maintained for four years, after which one crop of wheat, quite free of weeds, was produced. In 1942 a crop of sugar beets yielded 15 tons per acre even though adverse weather necessitated extremely late planting. Casual observations did not indicate any appreciable nematode damage. The following year the field was planted to wheat, and in 1944 sugar beets were again planted. This interval of only one year between beet crops proved to be entirely too short and the beet crop was abandoned after half of the field had been thinned. A second rotation period was then carried out with wheat in 1945, tomatoes in 1946, and wheat in 1947 and 1948. In 1949, after four years of non-susceptible crops, the field was again planted to sugar beets. A yield of about 23 tons per acre is being harvested. Although the present crop is very satisfactory, there is evidence of nematode activity and it would be disastrous to replant this field to sugar beets without an interval of 3 or 4 years of non-host crops.

The root knot nematode has a much wider host range than the sugar beet nematode and, therefore, the selection of satisfactory rotation crops is somewhat more difficult. Cereal crops such as barley, oats, wheat, milo or corn are usually the most satisfactory.

SEEDLING DISEASES

Seedling diseases may be affected both by the type of crop and by the method of culture during the year preceeding sugar beets. Crops like peas, beans, or spinach may increase the amount of damping-off fungi such as Pythium or Rhizoctonia if conditions are favorable for infection, whereas dry farmed crops tend to reduce these organisms. Temperature and soil moisture are so important in determining the severity or seedling disease, however, that the effects of previous crops are often obscured.

The beet water mold seedling disease may be severe in late planted beets following irrigated crops in the Delta area. If the soil is moist throughout the summer, the fungus multiplies in the soil about as rapidly with non-host crops like corn or cucumbers as it does with sugar beets, but it is suppressed by non-irrigated crops or by dry fallow following early maturing crops.

Early planting of treated seed offers the best possibility of escaping serious losses from seedling diseases. In late plantings with abundant moisture from rain or irrigation, seed treatment may not provide sufficient protection against infection by Rhizoctonia or by a high temperature Pythium and offers little or no protection against water mold infection.

Among the crops used in rotation with sugar beets, alfalfa is especially valuable because the long period of culture (usually 4 years) allows sugar beet nematode and most root rot fungi to be reduced



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BALING is completed with a standard 3-wire baler. Average yield is two tons of bales per acre.



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FEEDING is most efficient when the bales are broken open and ground. The resulting mixture of crowns and leaves is very palatable.

to a low level of survival. Alfalfa, however, is somewhat susceptible to the root knot nematode and to Rhizoctonia rot. Under some conditions its culture may actually increase the amount of either of these organisms in the soil.

Cereals such as barley, wheat or oats are resistant to nematodes and to nearly all of the fungi that attack beets. Since they are usually grown without irrigation and followed by a dry period during the remainder of the summer, these cereal crops fill an important place in rotation for disease control. Rarely with late rains or summer irrigation **Sclerotium rolfsii** may attack barley, and some weeds in the cereal crop may habor either root knot or sugar beet nematode.

In some cases beans are a favorable crop for rotation with beets but in other cases this sequence may be undesirable. Beans are quite susceptible to Rhizoctonia, **Sclerotium rolfsii,** the charcoal rot fungus and to root knot nematode. In fields where any of these troubles have been serious upon beets it may be preferable to use some other crop immediately preceeding the next beet crop. Beans are satisfactory, however, in rotations for reduction of sugar beet nematode.

Peas, on the other hand, are usually planted during the winter and matured with little or no irrigation during warm weather. This crop followed by summer fallow offers an excellent opportunity for the reduction of nearly all organisms that attack beets. This advantage is lost if they are double-cropped with beans.

Tomatoes are susceptible to stem infection by **Sclerotium rolfsii** but when grown on ridges that prevent irrigation water from saturating the surface soil in contact with the stem, little or no infection occurs and the fungus is not increased. This crop is very susceptible to root knot nematode and may increase the amount of Rhizoctonia when the fruit and vines are in contact with wet soil.

Crops of the cabbage family such as broccoli, cauliflower, brussels sprouts, radish, or mustard should not be used in rotations when the primary purpose is to reduce sugar beet nematode.

By selecting crops and cultural practices that avoid specific diseases and that encourage the reduction of the casual fungus or nematode, the grower can make the most profitable use of land and can grow the maximum number of successful beet crops.

In conclusion it should be added that the greatest value of rotation is to avoid severe infestations rather than to cure them. If growers who do not have infestations of **Sclerotium rolfsii** or sugar beet nematode planted beets no more often than once in three years, few of them would ever suffer from these pests. Growers who already have infested fields usually must use still longer rotations in order to avoid losses too heavy to bear.

Sugar beet growers who have special problems may secure additional information concerning the most effective and profitable sequence of crops for local areas by consulting the field superintendent of the sugar company or the farm advisor.

SPRECKELS NOW OFFERS COMPLETE LINE OF SPECIALTY SUGARS

By WILLIAM H. OTTEY
Sales Manager, Spreckels Sugar Company

Growers will benefit from the broadened sales of Spreckels sugar made possible by the presentation of five new packaged sugars.

After many months of experimenting, testing and market research, Spreckels Sugar Company recently announced this complete line of packaged sugars. This company now has the distinction of being the first beet sugar producer on the West Coast to offer its customers "specialty" sugars as well as granulated.

First off the production line at Spreckles, California, was Spreckels Confectioners Powdered in one-pound packages. This was followed by Spreckels Instant Dissolving Superfine, a fine-grain dessert and bar sugar, in a one-pound package. Spreckels Cubes, packed in a two-pound carton, are also now being distributed to retailers throughout the West. In the not-too-distant future, Spreckles Golden Brown will soon be on the market to complete the new line. And in addition to its regular five and ten-pound bags of Fine Granulated, Spreckels now offers customers this type of sugar in a new two-pound bag.



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NEW PRODUCTS from Spreckels' Sugar Company factories now grace the grocers' shelves. Spreckels is the first beet sugar producer on the Pacific Coast to add powdered, brown, superfine and cubes to its regular line.

The regular five and ten-pound bags of Fine Granulated will be re-designed to make this an integrated, color-coordinated line of sugars. Although each package and bag now has the same basic design, each product is individually identified by its own distinctive color shade.

Advertising in trade magazines, direct mail and regional sales meetings were used to announce the new line to jobbers, wholesalers and retailers. Point-of-sale material and a continuing program of newspaper advertising will be used to impress consumers with the fact that Spreckels now offers a complete line of package sugars.

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Editor
AUSTIN ARMER

The SPRECKELS SUGAR BEET BULLETIN is published bi-monthly by the Agricultural Department of the Spreckels Sugar Company as a service to its growers.

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SPRECKELS SUGAR COMPANY

Incorporated August 6, 1897

Two Pine Street
San Francisco 11, California

Authorized Capital Stock	$12,500,000.00
Capital Stock Outstanding	9,000,000.00

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F. G. Belcher	Director
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